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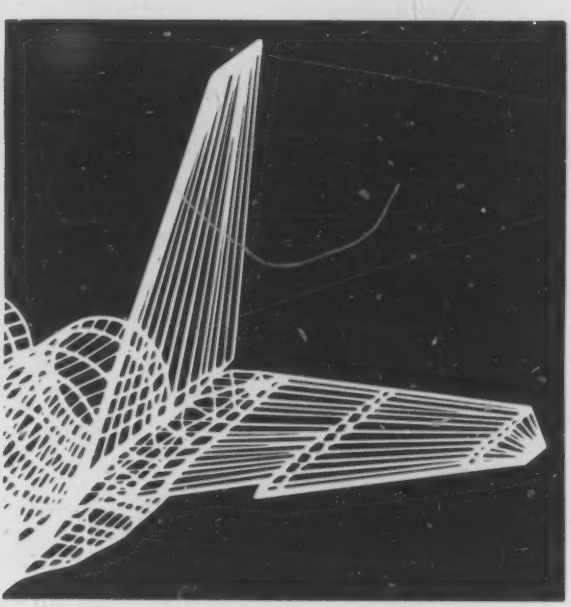

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foreword

This 32nd edition of *Aerospace Facts and Figures* tells the statistical story of the aerospace industry in 1983, a year characterized by appreciable real sales growth with gains substantially above the inflation rate in most categories of industry activity.

It has been our practice to put the statistical information into proper perspective by comparing the industry's current performance with that of its peak years in inflation-adjusted terms. In doing so this year, we have replaced the customarily-used Gross National Product deflator with a new government-developed 'aerospace deflator' which better reflects the industry's rate of inflation.

Applying this more realistic factor, we find that aerospace industry activity in 1983—as measured by constant-dollar sales volume—was higher than in any year since 1969, although below the levels of 1967-69. Using the constant dollar measure, overall sales in 1983 amounted to an increase of some eight percent above those of the previous year. That continues the real growth pattern evident since 1978, interrupted only in 1982.

The industry's achievements in the international marketplace once again underscore the importance to the U.S. economy of high-value, high-technology aerospace exports. In 1983, the U.S. as a whole experienced the worst international trade deficit in its history—more than $60 billion. In the same year, the aerospace industry recorded a positive trade balance of $12.6 billion—not a record, but a performance second only to the 1981 all-time high of more than $13 billion. There is gratifying testimony to the excellence of American aerospace products in this fact: in the first four years of the 1980s, when the U.S. suffered trade deficits totaling more than $153 billion, the adverse impact of such deficits was substantially softened by an offsetting aerospace trade surplus of $48.7 billion.

It is customary, when reviewing a year past, to attempt a projection for the future. Predicting tomorrow's levels of aerospace activity is a chancy matter in any year, due to the many variables involved; in this year, there is some question with regard to future defense business, normally the largest component of the industry's workload. The outcome of the national elections will obviously have significant impact on the industry's defense activity in coming years, since the opposing political factions have stated widely divergent views as to the appropriate level of national security outlays.

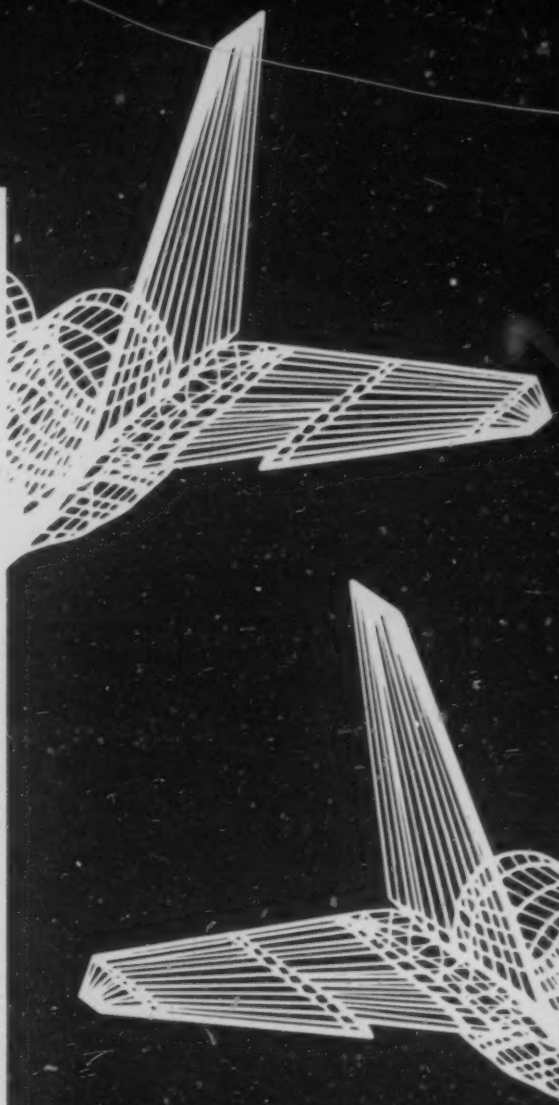
The outlook is generally good in the civil areas of aerospace industry activity. Congressional approval of the space station program augurs increased industry participation in NASA programs; additionally, commercial (non-NASA) space sales con-

tinue to grow and space work overall is becoming a more significant portion of the industry's total workload.

With regard to the outlook for commercial aircraft production, we note with interest the improvement of operating profits in the airline industry. That does not signal instant affluence for the airlines, because they are carrying heavy interest burdens that will erode much of the operating profit. The profit improvement is an optimistic indicator that the airline industry has turned the corner, but some airlines are still not in a position to order new airplanes. Others weathered the recent recession in better shape and they have already resumed their re-equipment programs; this is reflected in the fact that contracted orders for new transport aircraft in the first half of 1984 far exceeded the total for all of 1983. That fortifies industry predictions of substantially greater commercial aircraft manufacturing activity in the latter part of this decade.

We have a solid basis for projecting the near term in the current overall backlog. Orders on the books are at an all-time high, indicating that the industry's workload and financial posture will remain strong in the immediate future. We expect another growth year in 1984, thus closing out the first half of this decade at an activity level higher than any the aerospace industry has experienced since the late 1960s, when our companies were simultaneously engaged in the Apollo program, Vietnam war production and large-scale manufacture of wide-body jetliners.

Karl G. Harr, Jr.
President
Aerospace Industries Association



aerospace summary

In 1983, the aerospace industry recorded a significant gain in sales volume, an increase of more than 14 percent in current dollars and almost eight percent above the industry's inflation rate. The 1983 results represented a sharp rebound from the previous year, when the industry's sales increase failed to match the inflation rate due to depressed civil aircraft sales. In 1983, there were sales gains in all major categories of industry activity, including civil aircraft.

Here is a breakdown of the industry's 1983 performance:

Sales. In current dollars, total sales amounted to $75.8 billion, up from $66.2 billion. As is customary, sales of aircraft predominated in the breakdown by product group. At $41.2 billion, aircraft sales were up $5.8 billion over 1982, including a $4.6 billion increase in military aircraft and a $1.2 billion gain in civil aircraft sales. The dollar value of the industry's space workload increased by $3.3 billion and missile sales edged up slightly above the previous year's level.

Aerospace sales in 1983 represented 2.3 percent of the Gross National Product (up from 2.2 percent in 1982) and 3.6 percent of total sales by all U.S. manufacturing industries (up from 3.5 percent).

In computing inflation-adjusted constant dollars, this publication departs from the previous practice of employing the GNP deflator and uses instead a more realistic aerospace composite price deflator, which has shown a faster rate of inflation than the economy as a whole. On that basis, aerospace constant dollar sales amounted to $27.9 billion, a figure higher than in any year since 1969 but still below the peak years of 1967-69.

Profit. The industry realized a net profit after taxes of $2.8 billion, up from $2.2 billion in the previous year. As a percentage of sales, the profit amounted to 3.8 percent, which compares with 3.3 percent in 1982.The 1983 profit compares with average earnings of 4.1 percent for all U.S. manufacturing corporations.

Orders and Backlog. New orders in 1983 totaled $97.9 billion and the backlog at the end of the year amounted to $119.8 billion, an increase over 1982 of $14 billion. The 1983 backlog was composed of $76.9 billion in orders from the U.S. government and $42.9 billion in work for other customers.

As is traditional, orders for aircraft—including engines and parts—constituted the principal element of the backlog, $64.2 billion or more than 53 percent of the total. The major backlog increases were in government orders for aircraft ($8.4 billion) and government "other aerospace" orders; the latter category embraces conversions, modifications, ground support equipment and certain R&D contracts. There was a decline of $2.6 billion in aircraft orders from non-government sources.

Civil Aircraft Production. In 1983, the industry shipped 3,354 civil air-

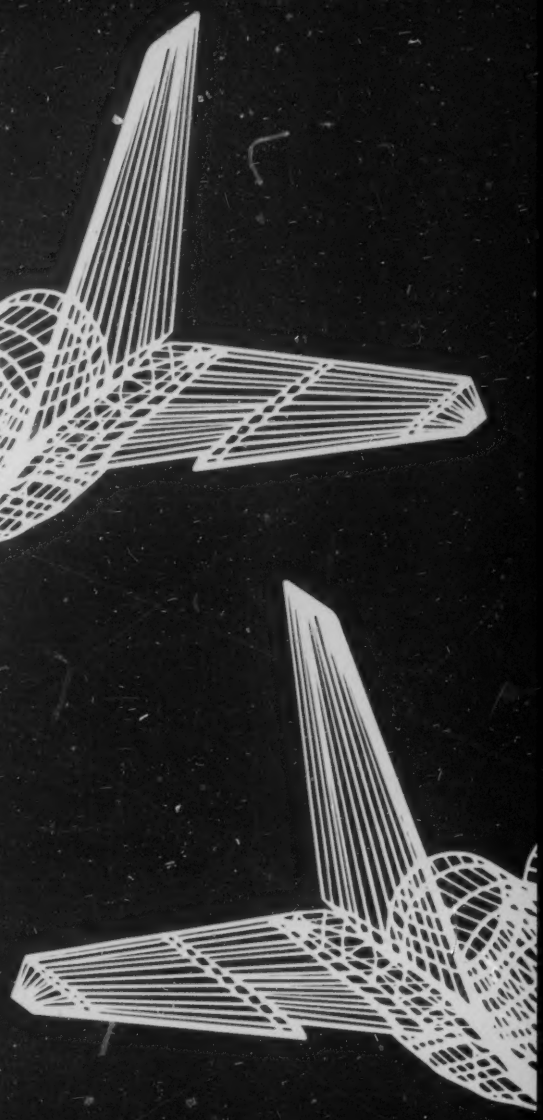
craft, some 1,700 fewer than in 1982, marking the fifth consecutive year of decline in the number of units. However, the dollar value of shipments rose by $1.1 billion to $9.7 billion.

As is customary, the bulk of the dollar value was in sales of commercial transports. The industry delivered 262 transports, 30 more than in 1982; their total value was $8 billion, up from $6.2 billion in the previous year but well below shipments in the peak year 1980 ($9.9 billion). The backlog for commercial transports declined for the fourth consecutive year; at the end of 1983, it was $12.6 billion, down from $16.3 billion at the end of the previous year. Units on order totaled 352, down from 455. Of particular concern was the continuing decline in orders from foreign customers, which formerly constituted more than half of the commercial airplane backlog; at year-end 1983, they were down to 43 percent of the transport backlog value.

Civil helicopter production, which had been on the rise in the latter 1970s, continued to slip as shipments declined by 186 units to a 1983 total of 401. The dollar value was $269 million, down from $365 million in 1982.

Shipments of general aviation aircraft totaled 2,691, which compared with 4,266 in the previous year and almost 18,000 in the peak year, only five years earlier. The value of shipments declined from $2 billion in 1982 to $1.5 billion in 1983.

Military Aircraft Production. The industry produced 1,040 military aircraft; that compares with 1,159 in



1982. The 1983 total included 753 aircraft destined for use by the U.S. military services; the other 287 were military aircraft sold to foreign customers on a commercial basis, or acceptances by the Department of Defense for delivery to foreign governments under Foreign Military Sales programs.

In Fiscal Year 1983, DoD outlays for aircraft procurement totaled $21 billion, up from $16.8 billion in FY 1982; the estimate for FY 1984 was $25 billion and for FY 1985 $30.5 billion.

Missile Programs. Industry sales of missile systems, including propulsion units and R&D work, amounted to $9.1 billion. In current dollars, this was a gain of $261 million, but adjusted for inflation it represented a decline slightly below the 1982 level. Bureau of the Census figures on missile sales—which exclude propulsion systems and funding for research, development, test and evaluation—showed a record $6.1 billion, up from $5.7 billion. New orders for missile systems totaling $7.2 billion increased the missile backog by more than $1 billion, to $8.3 billion at year-end 1983.

Space Programs. Combined sales of military and civil/commercial space systems, including R&D, amounted to $13.9 billion, an increase above the 1982 level of 32 percent. The increase was due for the most part to rapidly growing military space activities, as indicated by federal budget authority data. For FY 1983, DoD's authorization was $8.5 billion, compared with $6.3 billion for NASA. For FY 1984, DoD was authorized $10.6 billion, NASA $6.6 billion.

Non-aerospace Sales. In current dollars, sales of non-aerospace products and services by aerospace manufacturers totaled $11.6 billion, an increase of $167 million. In constant dollars, however, sales declined for the second straight year.

Research and Development. In 1983, funding for aerospace R&D increased to $16.4 billion from the previous year's $14 billion. The total for 1984 was estimated at $17.9 billion, including $12.9 billion in federal funding and $5 billion in company spending. Aerospace led all U.S. industries in the estimates for both years, and the two-year aerospace total represents 25 percent of all R&D funding (federal and company) for work performed by all U.S. business during those years. A McGraw-Hill projection for the years 1984-87 estimates that aerospace R&D will reach an annual level of $24.5 billion by 1987 and that the aerospace industry will retain its top ranking among U.S. industries.

Foreign Trade. In 1983, the U.S. experienced an international trade deficit of more than $60 billion. In contrast, the aerospace industry recorded a strong positive performance with a trade balance of $12.6 billion. The trade balance topped the previous year's $11 billion but fell short of the all-time high $13.1 billion accomplished in 1981. Aerospace exports totaled $16.1 billion, including civil exports of $10.6 billion and military exports amounting to $5.5 billion. Civil exports were up by almost $1 billion over 1982, while military exports fell by more than half a billion dollars. The net result was a total export gain of $462 million.

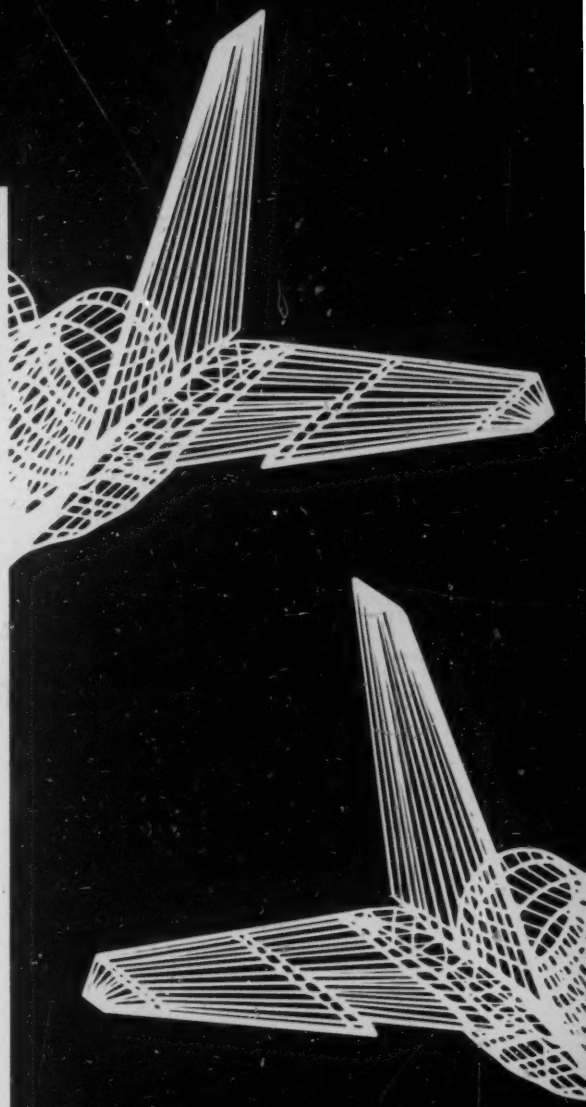
Foreign sales of transport aircraft

accounted for the greatest dollar value among civil export categories, even though transport exports were depressed in comparison with the peak levels of 1980-81. The industry delivered to foreign customers 129 commercial transports worth $4.7 billion, compared with 121 deliveries valued at $3.8 billion in the previous year.

Aerospace imports dropped well below the record $4.6 billion of 1982, but remained at a relatively high $3.4 billion.

Employment. Average employment in the aerospace industry during 1983 was 1,151,000, which was 6.2 percent of total employment in all U.S. manufacturing industries. The average figure was below the previous year's average, but an employment spurt in the last four months of 1983 brought the year-end total to 1,171,000, about 20,000 above the previous year-end figure. The upward trend continued through the first quarter of 1984. At the end of March 1984, employment reached 1,185,000.

The average number of production workers in the aerospace industry in 1983 was 522,000, a decline from 1982's 545,000. The drop was across the board, except for an increase of 5,000 workers in the missile/space category. Increasing research and development activity boosted employment among aerospace scientists and engineers engaged in R&D. They numbered (as of January 1983, the latest date for which figures are available) 99,500, an increase of more than nine percent over the previous year's 91,100.



STANDARD INDUSTRIAL CLASSIFICATIONS APPLICABLE TO THE AEROSPACE INDUSTRY

3721 **AIRCRAFT**
- 37211 Complete Aircraft, Military Type
- 37212 Complete Aircraft, Personal & Utility Type
- 37213 Complete Aircraft, Commercial Transport Type
- 37214 Modifications, Conversions, Overhaul of Aircraft
- 37216 Other Aeronautical Services on Aircraft

3724 **AIRCRAFT ENGINES AND ENGINE PARTS**
- 37241 Aircraft Engines for U.S. Military Customers
- 37242 Aircraft Engines for Other than U.S. Military
- 37243 Aeronautical Services on Aircraft Engines
- 37244 Aircraft Engine Parts and Accessories

3728 **AIRCRAFT PARTS AND AUXILIARY EQUIPMENT, NEC**
- 37281 Aircraft Parts & Accessories, NEC
- 37283 Research and Development on Aircraft Parts
- 37285 Aircraft Propellers and Parts

3761 **GUIDED MISSILES AND SPACE VEHICLES**
- 37611 Missile Systems, Excluding Propulsion
- 37612 Space Vehicle Systems, Excluding Propulsion
- 37613 Research & Development on Complete Missiles
- 37614 Research & Development on Complete Space Vehicles
- 37615 All Other Services on Complete Missiles & Space Vehicles

3764 **SPACE PROPULSION UNITS AND PARTS**
- 37645 Complete Missile or Space Vehicle Engines and/or Propulsion Units
- 37646 Research and Development on Complete Missile or Space Vehicle Engines and/or Propulsion Units
- 37647 All Other Services on Complete Missile or Space Vehicle Engines and/or Propulsion Units
- 37648 Missile and Space Vehicle Engine and/or Propulsion Unit Parts and Accessories

3769 **SPACE VEHICLE EQUIPMENT, NEC**
- 37692 Missile & Space Vehicle Parts & Subassemblies, NEC
- 37694 Research & Development on Missile & Space Vehicle Parts & Components, NEC

3662 **RADIO AND TELEVISION COMMUNICATION EQUIPMENT**
- 36621 Communication Systems and Equipment
- 36625 Search & Detection Systems and Navigation and Guidance Systems & Equipment
- 36629 Electronic Systems and Equipment NEC, including Electronic Trainers and Simulators

3811 **ENGINEERING AND SCIENTIFIC INSTRUMENTS**
- 38111 Aeronautical, Nautical, and Navigational Instruments, except Aircraft Engine Instruments

3829 **MEASURING AND CONTROLLING DEVICES**
- 38291 Aircraft Engine Instruments except Flight

Source: U.S. Government Office of Management and Budget. *Standard Industrial Classification Manual, 1972* (incorporating revisions from the 1977 Supplement).

NOTE: The Standard Industrial Classification (SIC) is a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. It is revised periodically to reflect the changing industrial composition of the economy.

NEC: Not elsewhere classified.

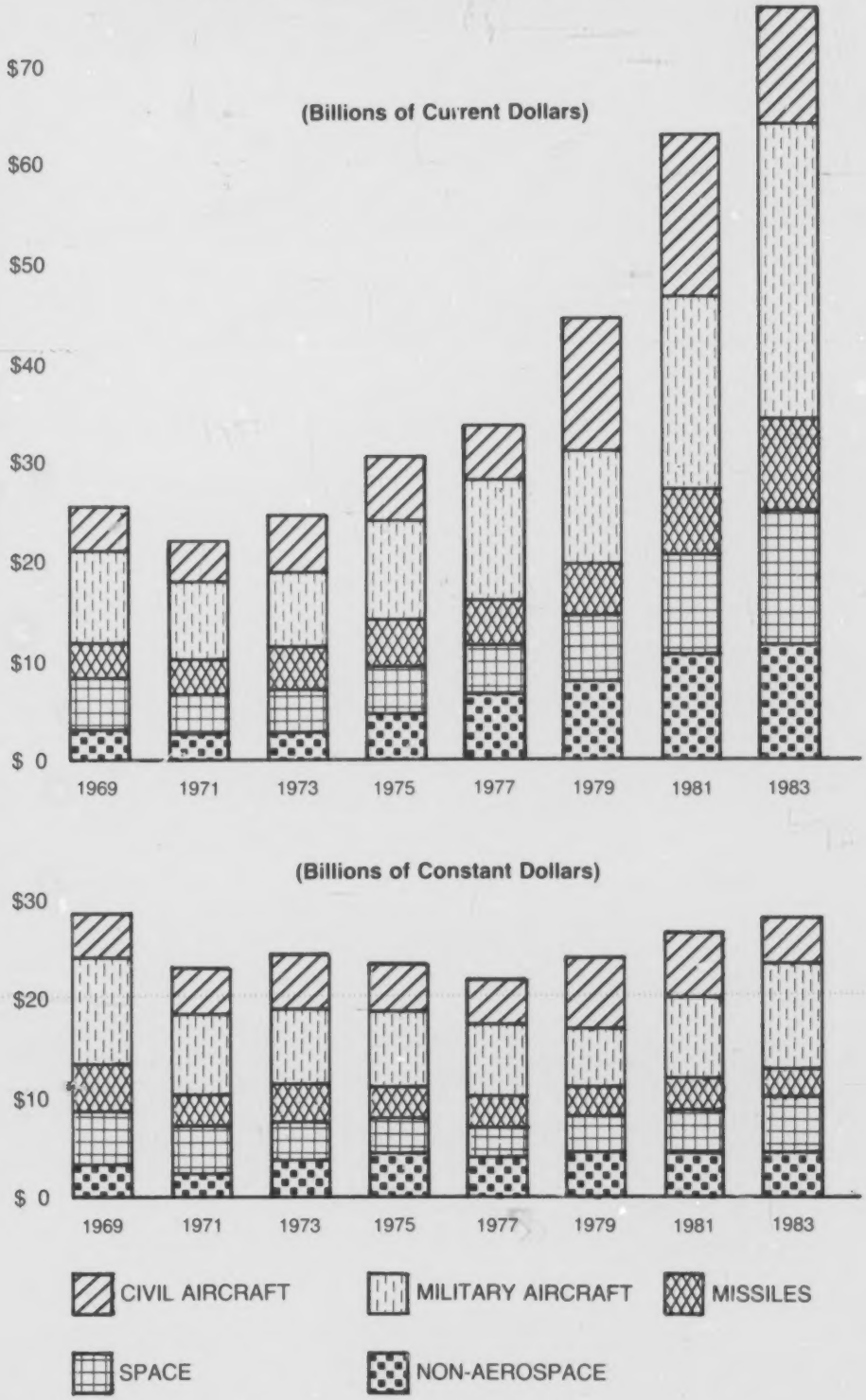
AEROSPACE INDUSTRY SALES BY CUSTOMER

Calendar Years 1969-1983
(Millions of Dollars)

Year	TOTAL SALES	Aerospace Products and Services				Non-Aerospace[a]	
		Total	U.S. Government		Other Customers[b]	U.S. Gov't	Other Customers
			Dept. of Defense	NASA and Other Agencies			
CURRENT DOLLARS							
1969	$25,278	$22,579	$13,832	$3,369	$ 5,378	$1,633	$1,066
1970	24,924	22,280	14,011	3,000	5,269	1,465	1,179
1971	22,064	19,541	11,877	2,779	4,885	1,372	1,151
1972	21,512	18,866	11,195	2,649	5,022	1,546	1,100
1973	24,744	21,401	11,846	2,459	7,096	1,925	1,418
1974	27,145	23,078	12,329	2,608	8,141	2,060	2,007
1975	30,356	25,564	13,795	2,838	8,931	2,496	2,296
1976	31,528	26,217	15,106	2,938	8,173	2,879	2,432
1977	33,854	27,750	16,023	3,012	8,715	3,625	2,479
1978	38,939	32,126	16,770	3,151	12,205	3,860	2,953
1979	44,210	36,495	17,708	3,453	15,334	4,087	3,628
1980	52,896	44,077	20,994	4,106	18,997	4,762	4,057
1981	63,211	52,327	26,490	4,700	21,137	5,986	4,898
1982[r]	66,154	54,764	32,451	4,909	17,404	6,265	5,125
1983	75,764	64,207	39,291	5,942	18,974	6,356	5,201
CONSTANT DOLLARS (1972 = 100)[c]							
1969	$28,627	$25,571	$15,665	$3,815	$6,091	$1,849	$1,207
1970	26,714	23,880	15,017	3,215	5,647	1,570	1,264
1971	22,746	20,145	12,244	2,865	5,036	1,414	1,187
1972	21,512	18,866	11,195	2,649	5,022	1,546	1,100
1973	23,792	20,578	11,390	2,364	6,823	1,851	1,363
1974	23,401	19,895	10,628	2,248	7,018	1,776	1,730
1975	23,067	19,426	10,483	2,157	6,786	1,897	1,745
1976	21,834	18,156	10,461	2,035	5,660	1,994	1,684
1977	21,813	17,880	10,324	1,941	5,615	2,336	1,597
1978	23,150	19,100	9,970	1,873	7,256	2,295	1,756
1979	23,718	19,579	9,500	1,852	8,226	2,193	1,946
1980	25,213	21,009	10,007	1,957	9,045	2,270	1,934
1981	26,728	22,126	11,201	1,987	8,937	2,531	2,071
1982	25,811	21,367	12,661	1,915	6,790	2,444	2,000
1983	27,865	23,614	14,451	2,185	6,978	2,338	1,913

Source: Aerospace Industries Association.
NOTE: See Glossary for explanation of "Aerospace Sales."
a Products and services other than aircraft, missiles, and space vehicles and parts, produced by establishments whose principal business is the development and or manufacture of aerospace products.
b All civil sales of aircraft (domestic and export), commercial space sales, and all military aircraft and missile exports, including both direct (manufacturer-to-foreign government) and Foreign Military Sales (FMS).
c Based on aerospace composite price deflator. Detail may not add to totals because of rounding.
r Revised.

AEROSPACE SALES BY PRODUCT GROUP



Source: Aerospace Industries Association

AEROSPACE INDUSTRY SALES BY PRODUCT GROUP

Calendar Years 1969-1983
(Millions of Dollars)

Year	TOTAL SALES	Aircraft			Missiles	Space	Non-Aerospace[a]
		Total	Civil	Military			
CURRENT DOLLARS							
1969	$25,278	$13,660	$ 4,267	$ 9,393	$ 3,624	$ 5,295	$ 2,699
1970	24,924	13,899	4,382	9,517	3,656	4,725	2,644
1971	22,064	11,897	3,764	8,133	3,283	4,361	2,523
1972	21,512	10,750	4,181	6,569	3,953	4,163	2,646
1973	24,744	13,376	5,742	7,634	3,899	4,126	3,343
1974	27,145	14,761	6,320	8,441	3,905	4,412	4,067
1975	30,356	16,350	6,463	9,887	4,528	4,686	4,792
1976	31,528	16,988	6,007	10,981	4,442	4,787	5,311
1977	33,854	18,312	6,183	12,129	4,437	5,001	6,104
1978	38,939	21,617	8,222	13,395	4,792	5,717	6,813
1979	44,210	24,659	13,227	11,432	5,291	6,545	7,715
1980	52,896	30,144	16,285	13,859	6,041	7,892	8,819
1981	63,211	35,898	16,427	19,471	6,965	9,464	10,884
1982[r]	66,154	35,388	10,935	24,453	8,841	10,535	11,390
1983	75,764	41,234	12,169	29,065	9,102	13,871	11,557
CONSTANT DOLLARS (1972 = 100)[b]							
1969	$28,627	$15,470	$ 4,832	$10,638	$ 4,104	$ 5,997	$ 3,057
1970	26,714	14,897	4,697	10,200	3,919	5,064	2,834
1971	22,746	12,265	3,880	8,385	3,385	4,496	2,601
1972	21,512	10,750	4,181	6,569	3,953	4,163	2,646
1973	23,792	12,862	5,521	7,340	3,749	3,967	3,214
1974	23,401	12,725	5,448	7,277	3,366	3,803	3,506
1975	23,067	12,424	4,911	7,513	3,441	3,561	3,641
1976	21,834	11,765	4,160	7,605	3,076	3,315	3,678
1977	21,813	11,799	3,984	7,815	2,859	3,222	3,933
1978	23,150	12,852	4,888	7,964	2,849	3,399	4,051
1979	23,718	13,229	7,096	6,133	2,839	3,511	4,139
1980	25,213	14,368	7,762	6,606	2,879	3,762	4,204
1981	26,728	15,179	6,946	8,233	2,945	4,002	4,602
1982	25,811	13,807	4,266	9,541	3,449	4,110	4,444
1983	27,865	15,165	4,476	10,690	3,348	5,102	4,250

Source: Aerospace Industries Association.
NOTE: See Glossary for explanation of "Aerospace Sales."
a Products and services other than aircraft, missiles, and space vehicles and parts, produced by establishments whose principal business is the development and/or manufacture of aerospace products.
b Based on aerospace composite price deflator. Detail may not add to totals because of rounding.
r Revised.

SALES OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1968-1983
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, & Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
CURRENT DOLLARS									
1968	$25,592	$16,635	$ 8,957	$ 7,411	$ 6,439	$ 6,076	$ 2,077	$1,040	$ 2,549
1969	24,648	16,560	8,088	7,161	5,603	5,660	2,539	986	2,699
1970	24,752	16,407	8,345	7,586	5,880	5,422	2,324	896	2,644
1971	21,679	14,114	7,565	6,313	5,079	4,971	1,909	884	2,523
1972	21,499	13,492	8,007	4,954	5,199	5,598	2,067	1,035	2,646
1973	24,305	14,431	9,874	5,539	6,739	5,580	2,103	1,001	3,343
1974	26,849	15,196	11,653	5,982	7,560	5,854	2,101	1,285	4,067
1975	29,473	17,314	12,159	6,859	7,797	6,310	2,070	1,645	4,792
1976	31,328	19,083	12,245	8,314	7,622	5,880	2,368	1,833	5,311
1977	33,315	20,704	12,611	8,848	7,530	5,775	2,839	2,219	6,104
1978	37,968	21,888	16,080	8,724	10,581	6,380[a]	3,363	2,107[a]	6,313
1979	46,173	23,229	22,944	8,649	16,023	7,197	3,930	2,659	7,715
1980	58,440	26,674	31,766	9,427	20,097	8,393	6,869	2,609	11,045
1981	69,944	33,039	36,905	12,047	21,527	9,722	8,155	3,384	15,109
1982[r]	75,487	42,239	33,248	15,120	16,766	11,980	9,909	4,953	16,759
1983	83,787	49,509	34,278	19,636	18,139	13,112	11,942	2,872	18,086
CONSTANT DOLLARS (1972 = 100)[b]									
1968	$30,144	$19,594	$10,550	$ 8,729	$ 7,584	$ 7,157	$ 2,446	$1,225	$ 3,002
1969	27,914	18,754	9,160	8,110	6,345	6,410	2,875	1,117	3,057
1970	26,529	17,585	8,944	8,131	6,302	5,811	2,491	960	2,834
1971	22,349	14,551	7,799	6,508	5,236	5,125	1,968	911	2,601
1972	21,499	13,492	8,007	4,954	5,199	5,598	2,067	1,035	2,646
1973	23,370	13,876	9,494	5,326	6,480	5,365	2,022	963	3,214
1974	23,146	13,100	10,046	5,157	6,517	5,047	1,811	1,108	3,506
1975	22,396	13,157	9,239	5,212	5,925	4,795	1,573	1,250	3,641
1976	21,695	13,215	8,480	5,758	5,278	4,072	1,640	1,269	3,678
1977	21,466	13,340	8,126	5,701	4,852	3,721	1,829	1,430	3,933
1978	22,573	13,013	9,560	5,187	6,291	3,793	1,999	1,253	4,051
1979	24,771	12,462	12,309	4,640	8,596	3,861	2,108	1,427	4,139
1980	27,855	12,714	15,141	4,493	9,579	4,000	3,274	1,244	5,265
1981	29,575	13,970	15,605	5,094	9,102	4,111	3,448	1,431	6,389
1982	29,453	16,480	12,972	5,899	6,542	4,674	3,866	1,933	6,539
1983	30,815	18,209	12,607	7,222	6,671	4,822	4,392	1,056	6,652

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).
a AIA estimate based on MQ37D data.
b Based on aerospace composite price deflator: detail may not add to totals because of rounding.
r Revised.

ORDERS AND BACKLOG OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1968-1983
(Millions of Current Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, & Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
NET NEW ORDERS									
1968	$27,168	$16,577	$10,591	$ 6,418	$ 7,867	$ 6,453	$ 2,115	$1,106	$ 3,209
1969	22,005	14,521	7,484	6,090	5,095	4,864	2,736	873	2,347
1970	21,161	15,116	6,045	6,373	3,469	5,611	2,379	808	2,521
1971	21,553	15,229	6,324	6,621	3,338	5,229	2,155	1,121	3,089
1972	23,842	14,817	9,025	5,760	5,745	6,090	1,853	965	3,429
1973	27,044	15,804	11,240	6,327	6,684	5,978	1,904	1,107	5,044
1974	32,704	19,390	13,314	7,956	8,612	6,827	2,208	1,872	5,229
1975	28,995	18,593	10,402	7,827	6,336	6,082	2,127	2,068	4,561
1976	35,992	21,056	14,936	9,513	8,410	5,751	2,431	3,241	6,646
1977	38,922	22,682	16,240	9,369	11,193	6,232	3,554	2,170	6,404
1978	49,819	25,992	23,827	11,150	16,961	7,072[b]	4,631	2,450[b]	7,555
1979[a]	65,208	28,107	37,101	8,762	30,695	7,609	5,184	4,487	8,471
1980	69,624	33,496	36,128	16,555	18,123	9,818	8,528	4,081	12,519
1981	74,922	42,431	32,491	16,946	17,911	12,376	9,350	3,250	15,089
1982	86,587	55,715	30,872	20,338	13,639	14,158	13,942	4,889	19,621
1983[a]	97,894	66,434	31,460	27,976	15,604	15,138	15,858	2,920	20,398
BACKLOG AS OF DECEMBER 31									
1968	$30,749	$16,343	$14,406	$ 8,150	$12,409	$ 5,083	$ 1,851	$ 983	$ 2,273
1969	28,297	14,298	13,999	7,089	12,099	4,338	2,001	880	1,890
1970	24,705	12,882	11,823	5,913	9,800	4,522	1,986	805	1,679
1971	24,579	13,997	10,582	6,221	8,059	4,780	2,232	1,042	2,245
1972	26,922	15,322	11,600	7,027	8,605	5,272	2,018	972	3,028
1973	29,661	16,695	12,966	7,815	8,550	5,670	1,819	1,078	4,729
1974	35,516	20,889	14,627	9,789	9,602	6,643	1,926	1,665	5,891
1975	35,038	22,168	12,870	10,751	8,141	6,415	1,983	2,088	5,660
1976	39,702	24,141	15,561	11,950	8,929	6,286	2,046	3,496	6,995
1977	45,309	26,119	19,190	12,471	12,592	6,743	2,761	3,447	7,295
1978	57,160	30,223	26,937	14,897	18,972	7,557	4,029	3,668	8,037
1979[a]	78,259	36,136	42,123	17,316	33,168	7,388	5,613	5,112	9,662
1980	89,732	37,199	52,533	17,435	39,800	8,941	8,421	5,127	10,008
1981[r]	94,710	46,591	48,119	21,292	35,022	11,255	9,052	4,940	13,149
1982[r]	105,810	60,067	45,743	26,435	31,969	13,432	13,107	4,854	16,013
1983	119,823	76,898	42,925	34,811	29,397	15,462	17,012	4,871	18,270

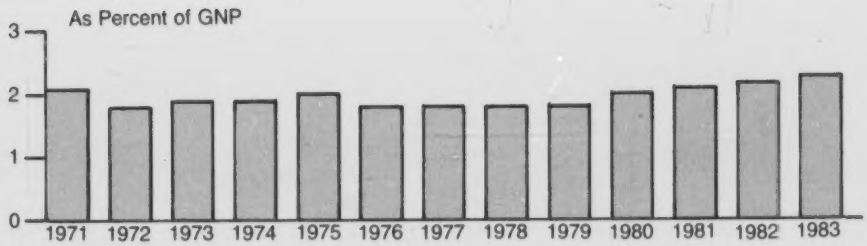
Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

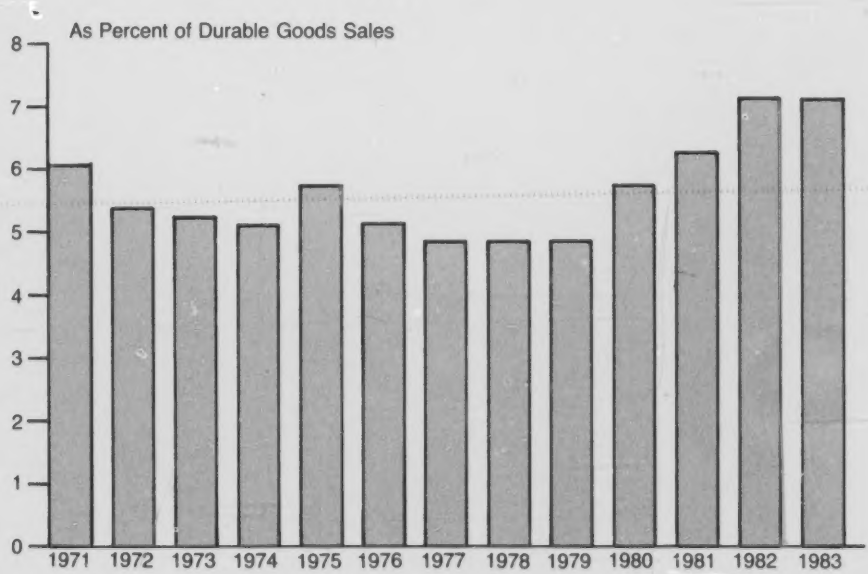
a The 1979 Orders and Backlog Totals have been revised to $67,561 million and $78,548 million, respectively, and the 1983 Orders total to $97,800 million, but product group details are not available.

b AIA estimate based on MQ37D data.

r Revised.

AEROSPACE SALES





Source: Aerospace Industries Association

AEROSPACE SALES AND THE NATIONAL ECONOMY

Calendar Years 1971-1983
(Billions of Dollars)

Year	Gross National Product	Industry Sales			Aerospace Sales As Percent of		
		Manufacturing[r]	Durable Goods[r]	Aerospace	GNP	Manufacturing	Durable Goods
CURRENT DOLLARS							
1971	$1,077.6	$ 670.9	$ 359.5	$22.1	2.1%	3.3%	6.1%
1972	1,185.9	756.3	408.3	21.5	1.8	2.8	5.3
1973	1,326.4	875.2	476.2	24.7	1.9	2.8	5.2
1974	1,434.2	1,017.5	530.8	27.1	1.9	2.7	5.1
1975	1,549.2	1,039.1	523.9	30.4	2.0	2.9	5.8
1976	1,718.0	1,185.6	608.4	31.5	1.8	2.7	5.2
1977	1,918.3[r]	1,358.4	711.2	33.9	1.8	2.5	4.8
1978	2,163.9	1,522.9	814.2	38.9	1.8	2.6	4.8
1979	2,417.8	1,727.2	912.7	44.2	1.8	2.6	4.8
1980	2,631.7[r]	1,852.7	930.6	52 9	2.0	2.9	5.7
1981	2,954.1[r]	2,017.5	1,006.5	63.2	2.1	3.1	6.3
1982	3,073.0[r]	1,910.1	922.1	66.2[r]	2.2	3.5	7.2
1983	3,309.5	2,085.0	1,053.0	75.8	2.3	3.6	7.2
CONSTANT DOLLARS (1972 = 100)[a]					**Real Annual Growth[b]**		
					GNP	Mfg.	Durs.	Aero.
1971	$1,122.4	$ 698.8	$ 374.4	$22.8	3.4%	0.9%	1.1%	(16.5)%
1972	1,185.9	756.3	408.3	21.5	5.7	8.2	9.1	(5.7)
1973	1,254.3	827.6	450.3	23.8	5.8	9.4	10.3	10.7
1974	1,246.3	884.2	461.2	23.4	(0.6)	6.8	2.4	(1.7)
1975	1,231.6	826.1	416.5	23.1	(1.2)	(6.6)	(9.7)	(1.3)
1976	1,298.2	895.9	459.7	21.8	5.4	8.4	10.4	(5.6)
1977	1,369.7	969.9	507.8	21.8	5.5	8.3	10.5	0.0
1978	1,438.6	1,012.4	541.3	23.1	5.0	4.4	6.6	6.0
1979	1,479.5	1,056.9	558.5	23.7	2.8	4.4	3.2	2.6
1980[r]	1,475.0	1,038.4	521.6	25.2	(0.3)	(1.8)	(6.6)	6.3
1981[r]	1,513.8	1,033.9	515.8	26.7	2.6	(0.4)	(1.1)	6.0
1982[r]	1,485.4	923.3	445.7	25.8	(1.9)	(10.7)	(13.6)	(3.3)
1983	1,534.8	966.9	488.3	27.9	3.3	4.7	9.6	8.1

Source: Gross National Product and GNP Implicit Price Deflator: "Economic Report of the President" (Annually) and "Survey of Current Business" (Monthly). Sales of Manufacturing and Durable Goods Industries: "Survey of Current Business" (Monthly). Aerospace Sales: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Sales."

a Based on aerospace composite price deflator for aerospace industry sales, and GNP implicit price deflator for other series.

b Parentheses indicate negative real annual growth.

r Revised.

GROSS NATIONAL PRODUCT, FEDERAL BUDGET AND DEFENSE BUDGET

Fiscal Years 1950-1985
(Billions of Dollars)

Year	Fiscal Year GNP[r]	Federal Budget Outlays		Defense Outlays as Percent of	
		Net Total[a]	Defense[b]	GNP[r]	Federal Budget[r]
1950	$ 265.1[r]	$ 42.6	$ 13.7	5.2%	32.2%
1951	312.8	45.5	23.6	7.5	51.9
1952	339.3	67.7	46.1	13.6	68.1
1953	361.3	76.1	52.8	14.6	69.4
1954	364.2	70.9	49.3	13.5	69.5
1955	380.6	68.5	42.7	11.2	62.3
1956	411.8	70.5	42.5	10.3	60.3
1957	433.9	76.7	45.4	10.5	59.2
1958	443.1	82.6	46.8	10.6	56.7
1959	474.4	92.1	49.0	10.3	53.2
1960	497.9	92.2	48.1	9.7	52.2
1961	509.3	97.8	49.6	9.7	50.7
1962	548.2	106.8	52.3	9.5	49.0
1963	578.0	111.3	53.4	9.2	48.0
1964	618.2	118.6	54.8	8.9	46.2
1965	659.5	118.4	50.6	7.7	42.7
1966	724.1	134.7	58.1	8.0	43.1
1967	777.3	157.6	71.4	9.2	45.3
1968	831.3	178.1	81.9	9.9	46.0
1969	910.6	183.6	82.5	9.1	44.9
1970	968.8	195.7	81.7	8.4	41.7
1971	1,031.5	210.2	78.9	7.6	37.5
1972	1,128.8	230.7	79.2	7.0	34.3
1973	1,252.0	245.6	76.7	6.1	31.2
1974	1,379.4	267.9	79.3	5.8	29.6
1975	1,479.9	324.2	86.5	5.8	26.7
1976	1,640.1	364.5	89.6	5.5	24.6
1977	1,862.8	400.5	97.2	5.2	24.3
1978	2,091.3	448.4	104.5	5.0	23.3
1979	2,357.7	491.0	116.3	4.9	23.7
1980	2,575.8[r]	576.7	134.0	5.2	23.2
1981	2,882.0[r]	657.2	157.5	5.5	24.0
1982	3,057.3[r]	728.4	185.3	6.1	25.4
1983	3,228.8	796.0	209.9	6.5	26.4
1984[E]	3,558.7	853.8	237.5	6.7	27.8
1985[E]	3,890.1	925.5	272.0	7.0	29.4

Source: "The Budget of the United States Government" (Annually) and Office of Management and Budget, "Federal Government Finances, 1985 Budget Data."

a "Net Total" is government-wide total less intragovernmental transactions; excludes off-budget entities.

b "Defense" includes the military budget of DOD and other defense-related activities. Beginning in FY 1985, the Federal Budget reflects establishment of a military retirement trust fund. Defense budget data for prior years adjusted for comparable treatment of military retired pay.

E Estimate.

r Revised.

FEDERAL OUTLAYS
DEFENSE, NASA AND AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1960-1985
(Millions of Dollars)

Year	TOTAL National Defense[a]	TOTAL NASA	Federal Outlays for Aerospace Products & Services			Aerospace as Percent of Total National Defense and NASA[r]
			TOTAL	DOD[b]	NASA	
1960	$ 48,130	$ 401	$12,849	$12,502	$ 347	26.5%
1961	49,601	744	13,606	12,960	646	27.0
1962	52,345	1,257	15,135	13,992	1,143	28.2
1963	53,400	2,552	16,186	13,857	2,327	28.9
1964	54,757	4,171	17,938	14,205	3,733	30.4
1965	50,620	5,093	15,697	11,135	4,561	28.2
1966	58,111	5,933	17,771	12,411	5,360	27.7
1967	71,417	5,426	20,011	14,874	5,137	26.0
1968	81,926	4,724	21,355	16,757	4,598	24.6
1969	82,497	4,251	20,472	16,286	4,185	23.6
1970	81,692	3,753	18,747	15,048	3,699	21.9
1971	78,872	3,382	17,335	13,997	3,338	21.1
1972	79,174	3,422	16,999	13,627	3,372	20.6
1973	76,681	3,315	15,945	12,675	3,270	19.9
1974	79,347	3,256	15,782	12,601	3,181	19.1
1975	86,509	3,266	15,943	12,762	3,181	17.8
1976	89,619	3,669	16,843	13,295	3,548	18.1
Tr. Qtr.	22,269	952	3,944	3,018	926	17.0
1977	97,241	3,945	18,201	14,361	3,840	18.0
1978	104,495	3,983	12,624	8,765	3,859	11.6
1979	116,342	4,196	14,984	10,920	4,064	12.4
1980	133,995	4,852	18,297	13,585	4,712	13.2
1981	157,513	5,426	21,984	16,706	5,278	13.5
1982	185,308	6,035	27,057	21,131	5,926	14.1
1983	209,901	6,664	32,552	25,996	6,556	15.0
1984[E]	237,546	7,068	38,890	31,959	6,931	15.9
1985[E]	272,020	7,370	46,846	39,639	7,207	16.8

Source: "The Budget of the United States Government" (Annually).

NOTE: "National Defense" includes the military budget of the Department of Defense and other defense-related activities. "TOTAL NASA" includes all categories of the NASA budget. NASA construction not included in "Aerospace Products and Services." See additional explanation with following table.

a Beginning in FY 1985 the Federal Budget reflects establishment of a military retirement trust fund. Defense budget data for prior years adjusted for comparable treatment of military retirement pay.

b Prior to 1978, DOD outlays for aircraft and missile procurement and RTD&E. Effective 1978, includes only procurement; outlays for RDT&E by product group not available.

E Estimate.

r Revised.

FEDERAL OUTLAYS FOR AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1960-1985
(Millions of Dollars)

Year	TOTAL	Department of Defense[a]			NASA[b]
		TOTAL	Aircraft	Missiles[c]	
1960	$12,849	$12,502	$ 7,416	$5,086	$ 347
1961	13,606	12,960	6,963	5,997	646
1962	15,135	13,992	7,773	6,219	1,143
1963	16,186	13,857	7,799	6,058	2,327
1964	17,938	14,205	8,276	5,929	3,733
1965	15,697	11,135	7,138	3,997	4,562
1966	17,771	12,411	8,541	3,870	5,360
1967	20,011	14,874	10,442	4,432	5,137
1968	21,355	16,757	12,016	4,741	4,598
1969	20,472	16,286	11,367	4,919	4,185
1970	18,747	15,048	9,940	5,108	3,699
1971	17,335	13,997	8,849	5,148	3,338
1972	16,999	13,627	8,461	5,166	3,372
1973	15,945	12,675	7,614	5,061	3,270
1974	15,782	12,601	7,460	5,141	3,181
1975	15,943	12,762	7,697	5,065	3,181
1976	16,843	13,295	8,704	4,591	3,548
Tr. Qtr.	3,944	3,018	2,096	922	926
1977	18,201	14,361	9,321	5,040	3,840
1978	12,624	8,765	6,971	1,794	3,859
1979	14,984	10,920	8,836	2,084	4,064
1980	18,297	13,585	11,124	2,461	4,712
1981	21,984	16,706	13,193	3,513	5,278
1982	27,057	21,131	16,793	4,338	5,926
1983	32,552	25,996	21,013	4,983	6,556
1984[E]	38,890	31,959	24,961	6,998	6,931
1985[E]	46,846	39,639	30,504	9,135	7,207

Source: Department of Defense Budget (Annually); NASA Budget (Annually).

a Prior to 1978, DOD outlays for aircraft and missile procurement and RDT&E. Effective 1978, includes only procurement; outlays for RDT&E by product group no longer available.

b Includes Research & Development, and Research & Program Management, and, effective with 1984 data, Space Flight, Control and Data Communications; excludes Construction of Facilities.

c Effective 1978, for Army and Air Force only; Navy missile procurement outlays data no longer available as separate budget item.

E Estimate.

DEPARTMENT OF DEFENSE AEROSPACE OUTLAYS

Fiscal Years 1960-1985
(Millions of Dollars)

Year	DOD Aerospace Outlays[a]		
	TOTAL	Procurement	Research Development, Test and Evaluation
1960	$12,502	$ 9,299	$ 3,203
1961	12,960	8,870	4,090
1962	13,992	9,842	4,150
1963	13,857	10,126	3,731
1964	14,205	9,630	4,575
1965	11,135	7,296	3,839
1966	12,411	8,704	3,707
1967	14,875	10,341	4,534
1968	16,757	11,681	5,076
1969	16,286	11,686	4,600
1970	15,048	10,860	4,188
1971	13,997	9,771	4,226
1972	13,627	8,936	4,691
1973	12,675	8,089	4,586
1974	12,601	7,987	4,614
1975	12,762	8,373	4,389
1976	13,295	8,816	4,479
Tr. Qtr.	3,018	1,959	1,059
1977	14,361	9,389	4,972
1978	NA	8,765	NA
1979	NA	10,920	NA
1980	NA	13,585	NA
1981	NA	16,706	NA
1982	NA	21,131	NA
1983	NA	25,996	NA
1984[E]	NA	31,959	NA
1985[E]	NA	39,639	NA

Source: Department of Defense Budget (Annually).
a Excludes Military Assistance.
E Estimate.
NA Not Available.

DEPARTMENT OF DEFENSE
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE[a]

Fiscal Years 1977-1985
(Millions of Dollars)

	1977	1978
TOTAL	$95,650	$103,042
PROCUREMENT—TOTAL	18,178	19,976
AIRCRAFT	6,608	6,971
MISSILES	2,781	1,794
Ships	2,841	3,048
Combat Vehicles, Weapons & Torpedoes	833	2,140
Ordnance, Vehicles & Related Equipment	940	732
Electronics & Communications	1,197	1,349
Other Procurement	2,978	3,942
RESEARCH, DEVELOPMENT, TEST & EVALUATION—TOTAL	9,795	10,508
AIRCRAFT	2,176	NA
MISSILES	2,259	
ASTRONAUTICS	537	
Other	4,823	
Military Personnel—TOTAL	33,931	36,246
Active Forces	23,857	25,116
Reserve Forces	1,858	1,959
Retired Pay	8,216	9,171
Military Construction	1,914	1,932
Family Housing	1,358	1,405
Civil Defense	93	82
Operations and Maintenance	30,587	33,578
Other	(206)	(685)

Source: Department of Defenses Budget (Annually).
NOTE: Data in parentheses are credit items. The categories printed in capital letters are primarily aerospace, but others contain substantial parts attributable to aerospace activities. Detail may not add to totals because of rounding.
a Includes all items in the DOD military budget; excludes the DOD civil budget for the Army Corps of Engineers and other non-defense-related activities.
b Transferred to Federal Emergency Management Agency (FEMA) in 1979.
c Beginning in FY1985, the Federal Budget reflects establishment of a military retirement trust fund.
E Estimate.
NA Not Available.

DEPARTMENT OF DEFENSE
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE[a] (Continued)

Fiscal Years 1977-1985
(Millions of Dollars)

1979	1980	1981	1982	1983	1984[E]	1985[E]
$115,013	$132,840	$156,096	$182,850	$205,012	$231,000	$264,400
25,404	29,021	35,191	43,271	53,624	64,450	77,576
8,836	11,124	13,193	16,793	21,013	24,961	30,504
2,084	2,461	3,513	4,338	4,983	6,998	9,135
4,553	4,222	5,217	6,739	7,504	8,794	9,732
2,949	3,222	4,145	4,588	6,232	6,895	7,882
958	1,271	1,368	1,647	1,966	1,936	2,028
1,618	6,721	7,755	9,167	11,926	14,866	18,294
4,406						
11,152	13,127	15,278	17,729	20,554	25,157	30,458
NA	NA	NA	NA	NA	NA	NA
38,686	42,761	50,138	57,279	61,468	64,544	67,344
26,300	28,465	33,378	38,522	41,015	42,890	59,502
2,107	2,376	3,031	3,818	4,508	5,149	7,822
10,279	11,920	13,729	14,938	15,945	16,505	20[c]
2,080	2,450	2,463	2,922	3,524	4,072	4,908
1,468	1,680	1,721	1,993	2,126	2,578	2,865
(*b*)	(*b*)	(*b*)	(*b*)	(*b*)	(*b*)	(*b*)
36,424	44,770	51,920	59,674	64,915	68,539	76,855
(200)	(969)	(615)	(18)	(1,199)	1,660	4,394

FEDERAL PRICE DEFLATORS FOR GNP, DEFENSE, PPI and CPI

1960-1985

Year	GNP		Federal Gov't Defense Purchases		PPI Capital Equip.[a] (CY 1972 = 100)	CPI (Urban) All Items[a] (CY 1972 = 100)
	FY GNP[r] (FY 1972 = 100)	CY GNP (CY 1972 = 100)	Dur-ables[b] (FY 1972 = 100)	Goods & Services[a] (CY 1972 = 100)		
1960	69.57	68.70	73.30		76.74	70.8
1961	70.36	69.33	71.43		76.82	71.5
1962	71.38	70.61	71.39		77.15	72.3
1963	72.57	71.67	77.05		77.32	73.2
1964	73.64	72.77	76.62	NA	78.08	74.1
1965	74.99	74.36	77.45		79.00	75.4
1966	76.98	76.76	78.28		81.00	77.6
1967	79.44	79.06	80.85		83.68	79.8
1968	82.31	82.54	84.11		86.61	83.2
1969	86.18	86.79	86.86		89.46	87.6
1970	91.05	91.45	90.96		93.72	92.8
1971	95.62	96.01	96.63		97.57	96.8
1972	100.00	100.00	100.00	100.0	100.00	100.0
1973	104.45	105.75	102.94	106.6	103.35	106.2
1974	112.06	115.08	106.62	115.1	117.99	117.9
1975	123.27	125.79	112.87	124.9	135.98	128.7
1976	131.89	132.34	123.69	132.4	145.10	136.1
1977	140.77	140.05	135.53	141.9	154.48	144.9
1978	150.33	150.42	146.80	152.7	166.69	155.9
1979	163.46	163.42	162.72	166.0	181.17	173.5
1980	177.63	178.42[r]	181.93	187.5[r]	200.67	197.0
1981	194.99	195.14[r]	200.99	209.3[r]	221.17	217.4
1982	208.79	206.88[r]	225.10[r]	227.7[r]	233.81[r]	230.7
1983[p]	217.73	215.63[r]	240.67[r]	237.7[r]	240.42	238.1
1984[E]	226.81	225.4[r]	249.21[r]	NA	NA	NA
1985[E]	237.82	236.2[r]	260.89	NA	NA	NA

Source: GNP and Defense Purchases from U.S. Department of Commerce, Bureau of Economic Analysis; PPI-Capital Equipment Deflator and CPI Deflator from U.S. Department of Labor, Bureau of Labor Statistics, 1967 = 100, converted to 1972 base year by AIA. Estimates from Economic Assumptions of the Budget of the United States Government (latest year).

a Calendar years.
b Fiscal years.
r Revised from data previously reported by AIA.
p Preliminary.
E Estimate.
NA Not Available
Key: GNP = Gross National Product, Calendar Year (CY) or Fiscal Year (FY).
PPI = Producer Price Index for Capital Equipment.
CPI = Consumer Price Index (for all items).

FEDERAL PRICE DEFLATORS FOR AEROSPACE INDUSTRY

Calendar Years 1960-1985

Year	Aerospace Deflators (CY 1972 = 100)						
	Composite	SIC 3721	SIC 3724	SIC 3728	SIC 3761	SIC 3764	SIC 3769
1960	75.0	78.3	73.6	78.3	67.6	73.9	71.1
1961	75.2	78.1	74.2	77.9	67.5	74.3	72.6
1962	75.6	78.1	74.6	78.1	69.9	74.8	73.2
1963	75.6	78.0	74.2	78.0	71.7	74.3	72.8
1964	76.0	76.8	76.8	78.5	72.7	77.0	73.2
1965	77.4	78.5	77.6	79.9	73.6	77.7	75.4
1966	79.6	80.2	79.5	82.1	77.0	79.5	77.9
1967	82.4	82.8	81.8	84.3	80.6	82.1	80.3
1968	84.9	85.6	83.4	86.4	84.1	83.5	82.8
1969	88.3	88.9	87.3	89.1	87.3	87.4	86.4
1970	93.3	94.3	92.0	93.7	92.1	92.0	91.3
1971	97.0	98.2	95.5	97.3	95.9	95.5	95.1
1972	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1973	104.0	104.4	103.6	103.6	104.1	103.3	104.1
1974	116.0	115.6	117.5	119.6	111.3	117.3	116.7
1975	131.6	126.7	142.5	140.1	121.8	139.4	135.0
1976	144.4	140.4	154.6	153.2	132.8	150.9	147.6
1977	155.2	151.3	165.8	159.3	148.0	162.4	159.6
1978	168.2	163.5	182.5	173.4	159.1	177.1	172.3
1979	186.4	180.0	203.0	190.4	176.9	196.5	187.9
1980	209.8	202.4	229.5	213.3	201.5	221.2	210.3
1981	236.5	226.6r	264.3	236.5	224.1	248.2	236.2
1982	256.3	248.2	286.0	250.4	243.4	269.3	256.1
1983p	271.9	268.8	300.6	263.2	254.3	282.2	269.5
1984E	284.7	282.2	313.8	275.8	265.2	295.2	282.7
1985E	298.2	296.3	327.6	289.0	276.6	308.7	296.6

Source: U.S. Department of Commerce, Bureau of Economic Analysis and International Trade Administration.
p Preliminary.
E Estimate.
Key: SIC = Standard Industrial Classification. SIC 3721 = Aircraft; SIC 3724 = Aircraft Engines and Engine Parts; SIC 3728 = Aircraft Parts; SIC 3761 = Missiles and Space Vehicles; SIC 3764 = Space Populsion; SIC 3769 = Space Equipment not elsewhere classified. Aerospace Composite aggregated by weighting individual SIC categories according to value of industry shipments.

aircraft production

In 1983, the dollar value of U.S. aircraft production increased substantially above the previous year's level, but the number of aircraft produced continued to drop, as it has in every year since 1978. The higher value for fewer airplanes is explained by sales increases in high-value commercial transports and certain military aircraft, coupled with a major production decline in the lower-priced end of the general aviation category.

Sales of aircraft, engines and parts in 1983 amounted to $37.8 billion, a sharp rebound from the $31.9 billion recorded in 1982 and a new all-time peak. Sales to the U.S. government, predominantly the Department of Defense, totaled $19.6 billion, a gain of $4.5 billion above the 1982 figure. Sales to customers other than the U.S. government also increased, after declining in 1982; they amounted to $18.1 billion, up $1.4 billion. This was due to the earlier mentioned gain in commercial transport sales; although activity in that area remained depressed in comparison with the levels of 1979-81, it represented a big improvement over 1982.

The industry's backlog of orders for aircraft, engines and parts climbed significantly, due to a large increase in U.S. government orders. At year-end 1983, the backlog amounted to $64.2 billion, up from $58.4 billion at the end of the previous year. For the first time since 1976, the backlog of orders from U.S. government customers topped the non-government backlog. Government orders, at $34.8 billion, accounted for more than 54 percent of the total backlog; this was a reversal of the previous year's ratio, when non-government orders made up 54 percent of the total. Non-government backlog at year-end 1983 was $29.4 billion, down from $32 billion in 1982. Backlog data is a reflection of what has been happening to the civil/military aircraft sales mix since the start of the decade; government backlog has doubled while non-government backlog has declined about 26 percent.

Among other 1983 aircraft production highlights:

- The industry delivered 262 commercial transports, 30 more than in 1982; their value was $8 billion, compared with $6.2 billion in the previous year. However, the 1983 sales value was well below the levels of the peak years 1980 ($9.9 billion) and 1981 ($9.7 billion). The dollar value of civil transports on order declined for the fourth straight year; at the end of 1983, it was $12.6 billion, which compares with $16.3 billion in 1982, $17.2 billion in 1981, $20.8 billion in 1980 and the all-time high of $21.3 billion in 1979. In terms of numbers, there were orders for 352 transports on the books at year-end 1983; the comparable figures are 455 (1982), 526 (1981), 715 (1980) and 828 (1979).

Of particular concern was the drop in orders from foreign customers. For several years prior to 1981, foreign orders had constituted more than half of U.S. transport manufacturers' backlog. In 1981, and again in 1982, it was down to 45 percent of the total backlog value. In 1983, it dropped further—to 43 percent. Orders from foreign customers at year-end 1983 amounted to 139 airplanes valued at $5.4 billion; the comparable figures for 1982 were 196 transports worth $7.3 billion.

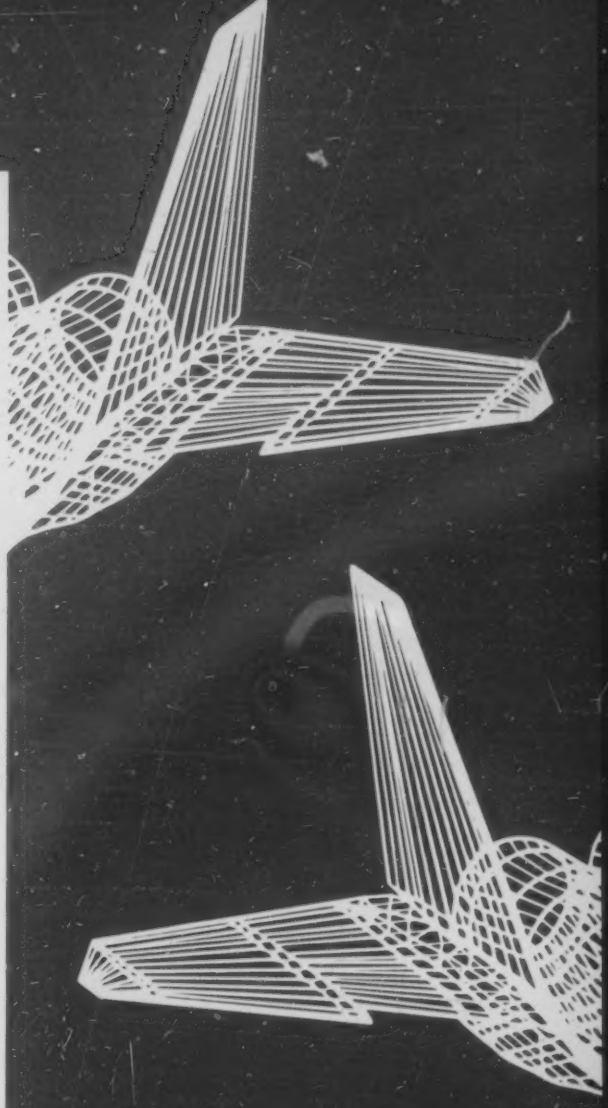
- Total civil aircraft shipments, including transports, numbered 3,354, the lowest figure in more than 30 years. The 1983 drop was due for the most part to a further decline in sales of general aviation aircraft. The industry delivered 2,691 general aviation units valued at $1.5 billion; this compared with 4,266 units

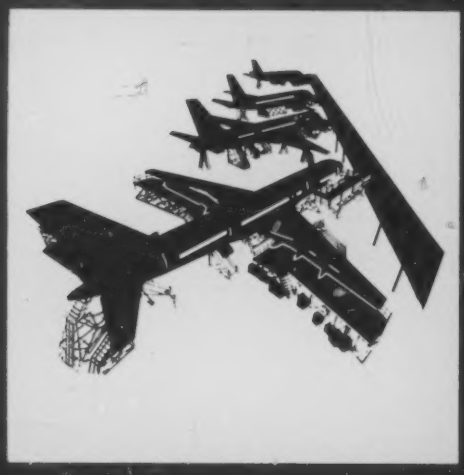
worth $2 billion in 1982. The sales decline was felt in all categories of general aviation aircraft, from single engine piston to business jets.

- Civil helicopter production, which had expanded dramatically in the decade of the 1970s, continued on the downward curve in evidence since 1980. The rotary wing segment of the industry produced 401 civil helicopters in 1983, the lowest number in more than 20 years; the figure compares with 587 in 1982 and 1,366 in the record year 1980. Dollar value in 1983 was $269 million, down from $365 million in 1982 and $656 million in the peak year.
- Military aircraft production totaled 1,040 units, down from 1,159 in 1982. The U.S. military services took delivery of 733 aircraft, up 63 from the 1982 level and the highest figure since 1975; the other 287 aircraft were exports under government-to-government Foreign Military Sales programs or by direct sale from a manufacturer to a foreign government.

In Fiscal Year 1983, Department of Defense outlays for aircraft procurement totaled $21 billion, up from $16.8 billion in FY 1982; the estimate for FY 1984 was $25 billion and for FY 1985 $30.5 billion.

In 1984, DoD's major procurement programs included the USAF B-1B bomber, whose FY 1984 cost estimate was $6.1 billion; the USAF F-16 fighter ($2.6 billion); the Navy F/A-18 fighter ($2.5 billion); the USAF F-15 fighter ($1.5 billion); the USAF C-5B heavy transport ($1.4 billion); the Army AH-64 attack helicopter ($1.4 billion); the Navy F-14 fighter ($1 billion); and the Navy AV-8B VTOL fighter ($913 million).





SALES OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years 1968-1983
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
CURRENT DOLLARS							
1968	$13,850	$ 7,411	$ 6,439	$ 5,697	$ 5,188	$1,714	$1,251
1969	12,764	7,161	5,603	5,382	4,517	1,779	1,086
1970	13,466	7,586	5,880	5,674	4,683	1,912	1,197
1971	11,392	6,313	5,079	4,953	4,093	1,360	986
1972	10,153	4,954	5,199	3,666	4,085	1,288	1,114
1973	12,278	5,539	6,739	4,231	5,322	1,308	1,417
1974	13,542	5,982	7,560	4,562	5,846	1,420	1,714
1975	14,656	6,859	7,797	5,269	6,001	1,590	1,796
1976	15,936	8,314	7,622	6,336	5,900	1,978	1,722
1977	16,378	8,848	7,530	6,855	5,670	1,993	1,860
1978	19,305	8,724	10,581	6,853	7,873	1,871	2,708
1979	24,672	8,649	16,023	6,378	12,701	2,271	3,322
1980	29,524	9,427	20,097	6,724	15,901	2,703	4,196
1981	33,574	12,047	21,527	8,197	16,877	3,850	4,650
1982[r]	31,886	15,120	16,766	10,903	12,316	4,217	4,450
1983	37,775	19,636	18,139	15,257	14,124	4,379	4,015
CONSTANT DOLLARS (1972 = 100)[a]							
1968	$16,313	$ 8,729	$ 7,584	$ 6,710	$ 6,111	$ 2,019	$1,473
1969	14,455	8,110	6,345	6,095	5,116	2,015	1,230
1970	14,433	8,131	6,302	6,081	5,019	2,049	1,283
1971	11,744	6,508	5,236	5,106	4,220	1,402	1,016
1972	10,153	4,954	5,199	3,666	4,085	1,288	1,114
1973	11,806	5,326	6,480	4,068	5,117	1,258	1,363
1974	11,674	5,157	6,517	3,933	5,040	1,224	1,478
1975	11,137	5,212	5,925	4,004	4,560	1,208	1,365
1976	11,036	5,758	5,278	4,388	4,086	1,370	1,193
1977	10,553	5,701	4,852	4,417	3,653	1,284	1,198
1978	11,477	5,187	6,291	4,074	4,681	1,112	1,610
1979	13,236	4,640	8,596	3,422	6,814	1,218	1,782
1980	14,072	4,493	9,579	3,205	7,579	1,288	2,000
1981	14,196	5,094	9,102	3,466	7,136	1,628	1,966
1982	12,441	5,899	6,542	4,059	4,805	1,645	1,736
1983	13,893	7,222	6,671	5,611	5,195	1,611	1,477

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).
a Based on aerospace composite price deflator; detail may not add to totals because of rounding.
r Revised.

ORDERS AND BACKLOG OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years, 1968-1983
(Millions of Current Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
NET NEW ORDERS							
1968	$14,285	$ 6,418	$ 7,867	$ 4,973	$ 6,648	$1,445	$1,219
1969	11,185	6,090	5,095	4,650	4,052	1,440	1,043
1970	9,842	6,373	3,469	4,946	2,941	1,427	528
1971	9,959	6,621	3,338	5,166	2,615	1,455	723
1972	11,505	5,760	5,745	4,495	4,317	1,265	1,428
1973	13,011	6,327	6,684	4,838	5,199	1,489	1,485
1974	16,568	7,956	8,612	5,948	6,467[a]	2,008	2,145[a]
1975	14,157	7,821	6,336	6,314	4,758[a]	1,507	1,578[a]
1976	17,923	9,513	8,410	7,498	6,316[a]	2,015	2,094[a]
1977	20,562	9,369	11,193	6,507	8,406	2,862	2,787
1978	28,111	11,150	16,961	9,055	14,229	2,095	2,732
1979	39,457	8,762	30,695	8,762	25,084[a]	2,348	5,611[a]
1980	34,678	16,555	18,123	11,606	14,427	4,949	3,696
1981	34,857	16,946	17,911	11,760	12,621	5,186	5,290
1982	33,977	20,338	13,639	15,768	10,588	4,570	3,051
1983	43,580	27,976	15,604	23,583	11,669	4,393	3,935
BACKLOG AS OF DECEMBER 31							
1968	$20,559	$ 8,150	$12,409	$ 5,999	$10,609	$2,151	$1,800
1969	19,188	7,089	12,099	5,270	10,340	1,819	1,759
1970	15,713	5,913	9,800	4,663	8,601	1,250	1,199
1971	14,280	6,221	8,059	4,876	7,123	1,345	936
1972	15,632	7,027	8,605	5,705	7,355	1,322	1,250
1973	16,365	7,815	8,550	6,312	7,232	1,503	1,318
1974	19,391	9,789	9,602	7,698	7,791	2,091	1,811
1975	18,892	10,751	8,141	8,743	6,646	2,008	1,495
1976	20,879	11,950	8,929	9,905	7,416	2,045	1,513
1977	25,063	12,471	12,592	9,557	10,152	2,914	2,440
1978	33,869	14,897	18,972	11,759	16,508	3,138	2,464
1979	50,484	17,316	33,168	13,331	27,955	3,985	5,213
1980	57,235	17,435	39,800	12,702	33,258	4,733	6,542
1981[r]	56,314	21,292	35,022	15,626	27,683	5,666	7,339
1982[r]	58,404	26,435	31,969	20,417	26,029	6,018	5,940
1983	64,208	34,811	29,397	28,752	23,564	6,059	5,833

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).
a AIA estimate, based on MQ37D data.
r Revised.

U.S. AIRCRAFT PRODUCTION

Calendar Years 1969-1983

CIVIL AIRCRAFT

Year	TOTAL	Domestic Shipments			Export Shipments		
		Transports[a]	Helicopters	General Aviation	Transports	Helicopters	General Aviation
1969	13,505	332	282	9,996	182	252	2,461
1970	8,076	127	150	5,246	184	332	2,037
1971	8,158	50	171	5,900	173	298	1,566
1972	10,576	79	319	7,702	148	256	2,072
1973	14,709	143	342	10,482	151	428	3,163
1974	15,326	91	433	9,903	241	395	4,263
1975	15,251	127	528	10,804	188	336	3,268
1976	16,429	64	442	12,232	158	315	3,218
1977	17,913	54	527	13,441	101	321	3,469
1978	18,962	130	536	14,346	111	368	3,471
1979	18,450	176	560	13,177	200	459	3,878
1980	13,634	150	841	8,703	237	525	3,178
1981	10,916	132	619	6,840	255	453	2,617
1982	5,085	111	333	3,326	121	254	940
1983	3,354	133	185	2,172	129	216	519

MILITARY AIRCRAFT

Year	TOTAL	U.S. Military Agencies	Exports		
			Total	FMS[b]	Commercial[c]
1969	4,290	3,644	646	NA	NA
1970	3,720	3,085	635	NA	NA
1971	2,914	2,232	682	NA	NA
1972	2,530	1,993	537	124	413
1973	1,821	1,243	578	129	449
1974	1,513	799	714	365	349
1975	1,779	844	935	525	410
1976	1,318	625	693	518	175
1977	1,134	454	680	408	272
1978	996	467	529	256	273
1979	837	531	306	203	103
1980	1,047	625	422	194	228
1981	1,062	703	359	215	144
1982	1,159[r]	690[r]	469	68	401
1983	1,040	753	287	46	241

Source: Civil shipments data from company reports to AIA and General Aviation Manufacturers Association. Military acceptances for use of U.S. military agencies and for reimbursable programs reported by USAF, USN and Army. Export data from Dept. of Commerce (Bureau of the Census) Report FT410.

a Prior to 1976, includes the C-130 military transport.

b Also includes acceptances of NATO AWACS aircraft.

c Military aircraft exported directly from manufacturer to foreign government.

NA Not available.

r Revised.

CIVIL AIRCRAFT SHIPMENTS

Calendar Years 1968-1983

Year	TOTAL	Transport Aircraft[a]	Helicopters	General Aviation
NUMBER OF AIRCRAFT SHIPPED				
1968	14,922	702	522	13,698
1969	13,505	514	534	12,457
1970	8,076	311	482	7,283
1971	8,158	223	469	7,466
1972	10,576	227	575	9,774
1973	14,709	294	770	13,645
1974	15,326	332	828	14,166
1975	15,251	315	864	14,072
1976	16,429	222	757	15,450
1977	17,913	155	848	16,910
1978	18,962	241	904	17,817
1979	18,450	376	1,019	17,055
1980	13,634	387	1,366	11,881
1981	10,916	387	1,072	9,457
1982	5,085	232	587	4,266
1983	3,354	262	401	2,691
VALUE—Millions of Dollars				
1968	$ 4,267	$ 3,789	$ 57	$ 421
1969	3,598	2,939	75	584
1970	3,546	3,158	49	339
1971	2,984	2,594	69	321
1972	3,308	2,660	90	558
1973	4,665	3,718	121	826
1974	5,091	3,993	189	909
1975	5,086	3,779	274	1,033
1976	4,592	3,078	285	1,229
1977	4,451	2,649	251	1,551
1978	6,458	4,308	328	1,822
1979	10,644	8,030	403	2,211
1980	13,058	9,895	656	2,507
1981	13,223	9,706	597	2,920
1982	8,610	6,246	365	1,999
1983	9,739	8,000	269	1,470

Source: Transport Aircraft and Helicopters: Aerospace Industries Association, company reports.
General Aviation: General Aviation Manufacturers' Association and Aerospace Industries Association.

a U.S.-manufactured fixed-wing aircraft over 33,000 pounds empty weight, including all jet transports plus the four-engine turboprop-powered Lockheed L-100.

CIVIL TRANSPORT AIRCRAFT BACKLOG[a]

As of December 31, 1979-1983

Company and Model	1979	1980	1981	1982	1983
TOTAL AIRCRAFT ON ORDER					
(Domestic and Foreign Orders)	828	715	526	455[b]	352[b]
Value (Millions of Dollars	$21,322	$20,799	$17,198	$16,321[b]	$12,591[b]
Boeing—TOTAL	611	535	447	356	273
B-727	212	104	35	19	8
B-737	159	175	146	93	93
B-747	106	71	37	26	22
B-757	40	49	82	80	58
B-767	94	136	147	138	92
Lockheed—TOTAL	56	50	27	11	1
L-1011	56	47	21	7	1
L-100	—	3	6	4	—
McDonnell Douglas—TOTAL	161	130	52	88[b]	78[b]
DC-9/MD-80	108	105	43	85[b]	78[b]
DC-10	53	25	9	3	—
TOTAL FOREIGN ORDERS	436	401	213	196	139
Value (Millions of Dollars)	$11,848	$12,166	$ 7,702	$ 7,322	$ 5,420
Boeing—TOTAL	312	303	180	142	100
B-727	74	48	10	1	—
B-737	127	134	71	45	29
B-747	88	70	37	26	18
B-757	19	22	22	22	16
B-767	4	29	40	48	37
Lockheed—TOTAL	33	32	17	9	1
L-1011	33	29	11	5	1
L-100	—	3	6	4	—
McDonnell Douglas—TOTAL	91	66	16	45	38
DC-9/MD-80	58	46	8	42	38
DC-10	33	20	8	3	—

Source: Aerospace Industries Association, company reports.

a Firm unfilled orders on the books, excluding options, for U.S. manufactured transport aircraft over 33,000 pounds, including all jet transports plus the turboprop-powered Lockheed L-100.

b Includes the following new MD-80 aircraft contracted for manufacturer-to-airline operating lease: 35 as of 12/31/82; 17 as of 12/31/83.

SHIPMENTS OF CIVIL TRANSPORT AIRCRAFT

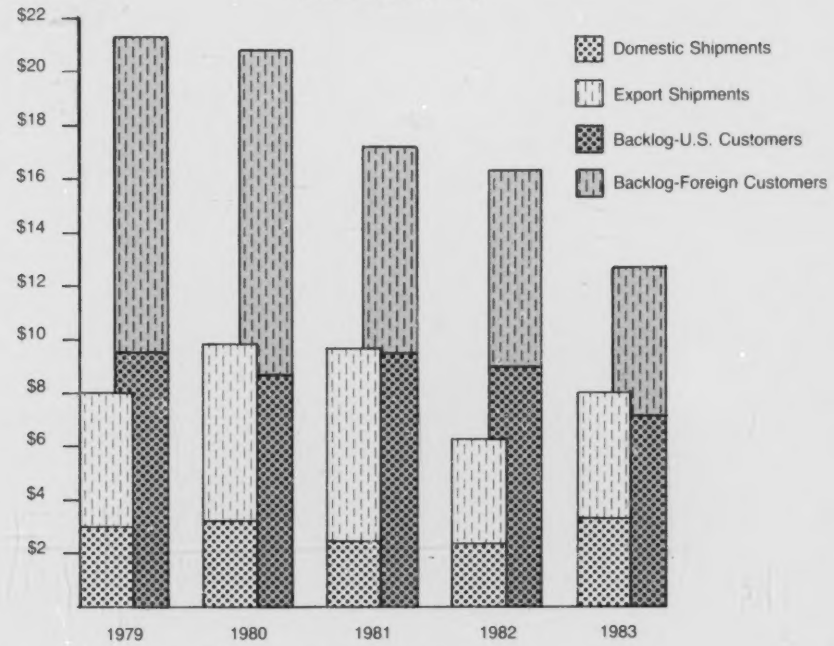
Calendar Years 1979-1983

Company and Model	1979	1980	1981	1982	1983
TOTAL					
Number of Aircraft Shipped	376	387	387	232	262
Value (Millions of Dollars)	$8,030	$9,895	$9,706	$6,246	$8,000
Boeing—TOTAL	281	296	255	169	196
B-707	1	—	—	1	—
B-727	136	131	94	26	11
B-737	77	92	108	95	82
B-747	67	73	53	25	23
B-757	—	—	—	2	25
B-767	—	—	—	20	55
Lockheed—TOTAL	21	26	36	17	11
L-1011	14	24	28	14	6
L-100	7	2	8	3	5
McDonnell Douglas—TOTAL	74	65	96	46	55
DC-9/MD-80	39	25	77	41	51
DC-10	35	40	19	5	4

Source: Aerospace Industries Association, company reports.

SHIPMENTS AND BACKLOG OF CIVIL TRANSPORT AIRCRAFT

(Billions of Dollars)



Source: Aerospace Industries Association.

SPECIFICATIONS OF U.S. CIVIL JET TRANSPORT AIRCRAFT[a]

On Order or In Production as of 1983

Number of Engines and Crew, and Model Designation[b]	Initial Service	Standard Mixed Class	Operating Empty Weight (000's lbs)	Maximum Takeoff Gross Weight (000's lbs)	Range (Nautical Miles)[c]	Engines (Manufacturer[d] and Model)
FOUR ENGINES/CREW OF 3						
747-200*	1971	452	379	775-833	5,350	P&W JT9D-7AW
747SP*	1976	331	325	700	6,100	P&W JT9D-7AW
747-300 (EUD)*	1983	496	388	775-785	5,500	P&W JT9D-7AW
THREE ENGINES/CREW OF 3						
727-200	1972	143	98	186-191	2,100	P&W JT8D-9A/15/17/17R
L-1011-100*	1975	304	246	466	3,460-3,705	RR RB211-22B
L-1011-500*	1979	242	246	496-504	5,040-5,225	RR RB211-524B4
DC-10-10*	1971	250	245	440	3,750	GE CF6-6D
DC-10-15*	1981	278	247	455	3,800-4,000	GE CF6-50C2-F
DC-10-30*	1972	275	271	580	5,470	GE CF6-50C2
DC-10-40*	1972	275	273	580	5,300	P&W JT9D-59A
TWO ENGINES/CREW OF 2						
737-200	1971	110	61	116-119	1,800	P&W JT8D-9A/15/17/17R
737-300	1984	128	72	125-136	2,300	CFMI-CFM56-3
757-200	1982	186	128-130	220-240	2,300-3,800	RR RB211-535C/E4 or P&W 2037
767-200*	1982	216	178-179	282-310	3,650	P&W JT9D-7R4 or GE CF6-80A
767-200ER*	1984	211	189-190	351	5,200	P&W JT9D-7R4 or GE CF6-80A
767-300*	1986	261	189-190	351	3,650	P&W JT9D-7R4 or GE CF6-80A
MD-80:						
MD-81	1980	142	78	140	1,700	P&W JT8D-209
MD-82	1981	142	78	149	2,080	P&W JT8D-217A
MD-83	1985	142	80	160	2,590	P&W JT8D-219

Source: Aerospace Industries Association, based on company reports.

a All jet-powered passenger transport aircraft 33,000 pounds or more empty weight.

b Manufacturers are The Boeing Company (727, 737, 747, 757, and 767), Lockheed Corporation (L-1011), and McDonnell Douglas Corporation (MD-80 and DC-10).

c Full passenger load and baggage.

d P&W = Pratt and Whitney Aircraft Company of United Technologies Corporation; GE = General Electric Company; RR = Rolls-Royce Limited; CFMI = General Electric/Snecma.

* Wide-body aircraft.

SPECIFICATIONS OF U.S. CIVIL HELICOPTERS

In Production as of 1983

Company	Commercial Model	Number of Places	Useful load (Lbs.)	Range with Useful Load (N. Miles)	External Cargo Payload (Lbs.)
Bell Helicopter Textron Textron Inc.	206 Series 206L Series 212 214 Series 222 412	4-5 7 15 16-18 7-10 15	1315-1630 1894-1931 5238 5450-8035 2985 5333	240-304 297-308 226 219-435 356 232	1200-1500 2000 5000 6000-8000 2500 5000
Boeing Vertol Company	234 (LR) 234 (UT)	47 3	23,300 30,000	620 264	28,000 28,000
The Enstrom Helicopter Corp.	F-28 Series 280 Series	3 3	700-850 700-850	238-272 243-272	500-1000 500-1000
Hiller Helicopters Rogerson Aircraft Corp.	12-E Series 12-ET Series FH-1100	3-4 3-4 5	1264-1341 1450 1355	215 351 396	1000 1000 1500
Hughes Helicopters, Inc. McDonnell Douglas Corp.[b]	300 Series[a] 500 Series	3 4-7	698-1004 1320-1660	191-224 276-287	1104 1560-2000
Hynes Helicopter, Inc.	B-2B 305	2 5	670 1200	225 275	400 800
Robinson Helicopter Co.	R22	2	468	208	—
Schweizer Aircraft Corp.	300C	3	698-1004	191-224	1104
Sikorsky Aircraft Div. United Technologies Corp.	S-76 (MARK II) S-70C Commercial Utility	14 19	4525 11,862	466 297	4200 8000

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada, Mexico and Puerto Rico, 1982/83 " and "AIA Directory of VTOL Aircraft, 1983."

a In 1983, Schweizer Aircraft became the licensed manufacturer for the Hughes 300C, redesignated the Schweizer-Hughes 300C, with product support beginning in 1983, and production beginning in 1984.

b McDonnell Douglas Corporation acquired Hughes Helicopters in January 1984.

COMMERCIAL HELICOPTER SHIPMENTS[a]

Calendar Years 1979-1983

Company and Model	1979	1980	1981	1982	1983
COMMERCIAL SHIPMENTS	1,054	1,452	1,105	629	455
Value (Millions of Dollars)	$ 457	$ 754	$ 783	$442	$359
CIVIL SHIPMENTS	1,029[r]	1,366	1,072	587	401
Value (Millions of Dollars)	$ 403	$ 656	$ 597	$365	$269
Bell—TOTAL	612	780	609	272	174
205	18	30[c]	—	—	—
206 series	469	550	476	193	107
212	86	116	49	32	6
214 series	8	7	12	10	11
222	—	41	21	15	17
412	—	—	51	22	18
AH-1S[b]	1	1	—	—	15
UH-1H[b]	30	35	—	—	—
Boeing Vertol—TOTAL	4	6	28	9	2
CH-47/414[b]	4	6	28	8	—
234	—	—	5	1	2
Brantley-Hynes—TOTAL	2	—	—	—	—
B-2B	2	—	—	—	—
Enstrom-TOTAL	46	48	46	24	9
F-28 series	27	18	29	17	8
280 series	19	30	17	7	1
Hiller—TOTAL	43	49	30	32[c]	7
12-E series	43	41	23	26[c]	6
12-ET series	—	8[c]	6	3	1
FH-1100	—	—	1	3	—
Hughes—TOTAL	306	401	186	176[c]	163
300 series	110	136	50	54	67
500 series	196	265[c]	136[c]	122	96[c]
Robinson—TOTAL	10[r]	78	156	88	64
R22	10[r]	78	156	88	64
Sikorsky (UTC)—TOTAL	41	90	50	28	36
S-61	5	5	—	—	—
S-76/H-76	36	85	50[c]	28	36[c]

Source: Aerospace Industries Association, company reports.

NOTE: All data exclude production by foreign licensees.

a Shipments to customers other than the U.S. Government, including all civil shipments plus commercial (manufacturer-to-customer) military exports, and excluding deliveries to U.S. military agencies for shipment to foreign governments under Foreign Military Sales.

b Military configuration for commercial export sale.

c Includes the following helicopters commercially exported in military configuration: 4 Bell 205's, 4 Hiller 12-ET's, and 36 Hughes 500's in 1980; 2 Hughes 500's and 8 Sikorsky S-76's in 1981; 20 Hiller 12-E's and 14 Hughes 500's in 1982; 26 Hughes 500's (Scout and MD TOW) and 13 H-76/S-76's in 1983.

r Revised.

GENERAL AVIATION AIRCRAFT SHIPMENTS

By Selected Manufacturers
Calendar Years 1979-1983

	1979	1980	1981	1982	1983
NUMBER OF AIRCRAFT SHIPPED	17,055	11,881	9,457	4,266	2,691[b]
Agricultural	593	357	340	174	1,811
Single-Engine, Piston	12,693	8,283	6,268	2,697	
Multi-Engine, Piston	2,843	2,116	1,542	678	417
Turboprop	637	795	918	458	321
Turbojet	289	330	389	259	142[b]
VALUE OF SHIPMENTS[a] (Millions of Dollars)	$ 2,211	$ 2,507	$2,920	$1,999	$1,470[b]
Agricultural	35	25	24	199	145
Single-Engine, Piston	490	365	315		
Multi-Engine, Piston	557	402	389	220	115
Turboprop	550	874	1,017	590	460
Turbojet	579	841	1,175	990	750[b]
Number of Aircraft By Selected Manufacturer					
Ayres	99	44	59	25	9[c]
Beech	1,508	1,394	1,242	526	402
Bellanca	443	103	—	—	—
Cessna	8,400	6,393	4,680	2,140	1,219
Fairchild	70	86	85	49	39
Gates Learjet	107	120	138	99	45
Gulfstream	400	167	284	96	71[b]
Lake	96	79	52	22	28
Lockheed Jetstar	7	4	—	—	—
Maule	67	59	44	39	36
Mooney	439	332	330	188	154
Piper	5,255	2,954	2,495	1,048	661
Rockwell International	164	146	40	—	—
Schweizer Aircraft	—	—	8	34	27

Source: General Aviation Manufacturers' Association and Aerospace Industries Association.
a Manufacturers' net billing price.
b Includes 3 off-the-shelf Gulfstream G-3's delivered to the U.S. Air Force for C-20 VIP transports.
c Data through August 1982.

MILITARY AIRCRAFT ACCEPTED BY U.S. MILITARY AGENCIES

Number and Flyaway Value
Calendar Years 1968-1983

Year	TOTAL	Bomber/ Patrol/ Command/ Control	Fighter/ Attack	Trans- port/ Tanker	Trainer	Heli- copter	Other
NUMBER							
1968	4,440	34	1,007	18	292	2,800	289
1969	3,644	31	792	44	295	2,165	317
1970	3,085	66	734	37	173	1,944	131
1971	2,232	48	386	42	135	1,587	34
1972	2,117	13	563	29	148	1,312	52
1973	1,372	30	422	22	90	808	—
1974	1,110	50	478	27	49	506	—
1975	1,369	62	624	34	40	601	8
1976	1,143	55	646	67	11	348	16
1977	862	44	488	25	12	273	20
1978	723	30	478	28	—	166	21
1979	734	17	529	16	—	158	14
1980	819	16	551	15	18	189	30
1981	918	19	649	17	60	158	15
1982r	758	26	478	14	60	172	8
1983	799	28	397	18	120	230	6
FLYAWAY VALUE—Millions of Dollars							
1968	$3,871	$117	$2,451	$ 81	$167	$905	$150
1969	3,693	248	2,204	101	164	845	131
1970	3,920	545	1,940	555	111	694	75
1971	2,996	397	1,322	688	112	469	8
1972	3,247	129	2,068	536	100	396	18
1973	2,571	325	1,490	348	140	268	—
1974	2,224	584	1,222	101	111	206	—
1975	3,172	599	2,054	128	27	359	5
1976	4,729	547	3,421	340	27	384	10
1977	4,364	499	3,190	331	14	316	14
1978	4,664	689	3,496	237	—	225	17
1979	5,470	442	4,660	136	—	219	13
1980	6,514	475	5,282	178	32	516	31
1981	8,446	526	6,518	509	32	825	19
1982r	8,605	886	6,383	410	42	872	12
1983	9,008	1,087	6,371	513	79	948	10

Source: Departments of the Army, Navy, and Air Force.
NOTE: Data exclude gliders and targets, and include spares, spare parts, and support equipment that are procured with the aircraft. Effective 1972, includes aircraft accepted for shipment to foreign governments for military assistance programs and foreign military sales. 1972-1975, flyaway value does not include the value of planes produced for the security assistance programs and accepted by the USAF.
r Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES AIR FORCE[a]

Calendar Years 1982 and 1983
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1982	1983	1982	1983	1982	1983
AIR FORCE—TOTAL	365[r]	277[d]	$4,095[r]	$3,742	$4,928[r]	$4,537
Fighter/Attack—TOTAL	343[r]	241	3,287[r]	2,871	3,982[r]	3,537
A-7K	10	4	145	58	172	69
A-10A	89	35	668	333	783	376
F-15	50[r]	40	980[r]	915	1,145[r]	981
F-16	194	162	1,494	1,565	1,882	2,111
Transports/Tankers—TOTAL	14	18	410	513	440	521
C-130H	7	11	78	145	80	148
KC-10A	7	7	332	368	360	373
Command/Control—TOTAL	8	7	398	304	506	425
E-3A	4	3	308	229	406	343
TR-1A	4	4	90	75	100	82
Helicopters—TOTAL	—	11	—	54	—	54
UH-60A	—	11	—	54	—	54

Source: Department of the Air Force.
NOTE: Costs shown are approximate. Calendar year acceptances may derive from procurement quantities funded in more than one fiscal year.
a Air Force acceptances for own use; exclude FMS/MAP shipments.
b Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment and non-recurring costs associated with the manufacture of the aircraft.
c Weapon System Cost includes flyaway costs, peculiar ground equipment, training equipment and technical data.
d Excludes 3 C-20's (off-the-shelf Gulfstream G-3's) delivered to the Air Force (for VIP transport) and included in civil general aviation shipments.
r Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES ARMY[a]

Calendar Years 1982 and 1983
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]
	1982	1983	1982	1983	1983
ARMY—TOTAL	145[r]	136	$563[r]	$607	$720
Helicopters—TOTAL	137	130	551[r]	597	710
AH-1S	11	4	31	11	12
UH-60A	126	126	520[r]	586	698
Fixed-Wing—TOTAL	8[r]	6	12[r]	10	10
C-12	6	6	9	10	10
UV-18	2[r]	—	3[r]	—	—

Source: Department of the Army.
a Army acceptances for own use; exclude FMS/MAP shipments.
b Flyaway cost includes airframes, engines, electronics, communications, armament and other installed equipment.
c Weapon System Cost includes flyaway items, initial spares, ground equipment, training equipment and other support items.
r Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES NAVY[a]

Calendar Years 1982 and 1983
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1982	1983	1982	1983	1982	1983
NAVY—TOTAL	180r	340	$2,686r	$3,681	$3,419r	$5,035
Patrol—TOTAL	12	12	252r	316	302r	404
P-3C	12	12	252r	316	302r	404
Attack—TOTAL	18	21	439r	419	553r	564
A-6E	12	15	252r	262	276r	340
EA-6B	6	6	187	157	277	224
Fighters—TOTAL	59	98	1,648r	2,570	2,127r	3,600
F-14A	30	30	761	877	875	1,117
F/A-18[d]	29	68	887r	1,693	1,252r	2,483
Helicopters—TOTAL	31r	89	305r	297	386r	379
CH-53E	24	20	301	254	381	322
TH-57	7r	69	4r	43	5r	57
Support—TOTAL	60	120	42	79	51	88
T-34	60	120	42	79	51	88

Source: Department of the Navy.

a Navy acceptances for own use; excludes FMS shipments.

b Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment, non-recurring costs and ancillary equipment.

c Weapon System Cost includes flyaway items, initial spares, ground equipment, training equipment and other support items.

d 1982 acceptances included twenty limited production aircraft and nine full-production aircraft; cost figures therefore are not representative of full-rate production costs.

r Revised.

MILITARY AIRCRAFT ACCEPTANCES FOR REIMBURSABLE PROGRAMS[a]

Calendar Years 1982 and 1983
(Millions of Dollars)

Accepting Agency, Type and Model	Number of Aircraft Accepted		Flyaway Cost[b]	
	1982	1983	1982	1983
TOTAL ACCEPTANCES FOR REIMBURSABLE PROGRAMS	68	46	$1,261	$978
AIR FORCE—TOTAL	64	42	$1,182	$895
Fighter/Attack—TOTAL	58	37	1,009	511
F-5E	12	4	72	30
F-5F	2	6	13	43
F-15	44	18	924	351
F-16	—	9	—	87
Command/Control—TOTAL	2	5	157	384
E-3A (NATO AWACS)	2	5	157	384
Helicopters—TOTAL	4	—	16	—
214	2	—	11	—
412	2	—	5	—
NAVY—TOTAL	4	4	$ 79	$ 83
Patrol—TOTAL	4	4	79	83
P-3C	4	4	79	83

Source: Departments of the Air Force and Navy.
a Foreign Military Sales and NATO AWACS Program.
b Flyaway cost includes airframes, engines, electronics, communications, armament, other installed equipment and nonrecurring costs associated with the manufacture of the aircraft.

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a]

Fiscal Years 1983, 1984 and 1985
(Millions of Dollars)

Agency, Type and Model	1983		1984[E]		1985[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
A-10 A/B Thunderbolt II	—	$ 76.2	—	$ —	—	$ —
B-1B	7	4,033.5	10	6,124.5	34	7,712.3
B-52G/H Cruise Missile Carrier Aircraft Modification (Ext.)	41	112.7	27	69.2	27	67.1
B-52H Cruise Missile Carrier Aircraft Modification (Int.)	—	—	—	16.4	6	84.7
B-52G/H Avionics Modernization	64	331.2	39	173.8	—	—
C-5A Wing Modification	18	184.6	24	241.6	—	—
C-5B Galaxy	1	798.9	4	1,367.1	10	2,189.8
C-130H Hercules	8	176.3	10	174.0	—	—
E-3A (AWACS)	2	142.6	—	76.2	—	—
European Distribution System Aircraft (EDSA)	2	6.5	16	35.7	—	—
EF-111A Modification	9	202.8	—	11.0	—	23.4
F-5F	3	20.3	—	—	—	—
F-15 A/B/C/D Eagle	39	1,479.0	36	1,526.2	48	2,213.5
F-16 A/B Falcon	120	2,244.5	144	2,551.3	150	4,145.4
KC-10A ATCA Extender	8	919.3	8	796.0	8	703.0
KC-135 Re-engining/Modern	19	463.4	29	543.0	50	982.3
TR-1/U-2[b]	5	197.7	5	218.8	4	365.1
C-20A (C-SAM)	—	—	—	—	3	60.8
LANTIRN (Night Precision Attack)	—	—	—	—	—	190.3
PLSS (Precision Location Strike System)	—	1.8	—	8.8	—	129.3
Tactical Fighter Derivative A/c	—	—	—	—	—	26.6
MC-130H Combat Talon	1	40.5	2	71.1	2	101.4
Wide Bodied Cargo Airlift	3	144.8	—	—	—	—
T-46A Next Generation Trainer	—	—	—	7.9	10	132.0
C-12D	—	—	6	11.8	—	—
Range Control Aircraft	—	—	—	—	2	16.4
ARMY						
AH-1S Cobra/Tow	11	$ 53.3	—	$ —	—	$ —
AH-64 Attack Helicopter	48	896.9	112	1,360.4	144	1,476.2
C-12	12	21.0	6	11.7	—	—
RC-12D	6	45.9	—	33.8	9	90.2
CH-47 Modernization	24	287.3	36	357.9	48	497.9
UH-60A Blackhawk	96	580.8	84	445.7	78	521.1
EH-60A Quick Fix	—	23.1	12	160.5	18	212.2
OH-58D AHIP Mod	—	28.4	16	189.5	44	244.0
NAVY						
A-6E Intruder	8	$ 224.4	6	$ 235.0	6	$ 257.9
AV-8B	21	896.3	27	913.2	32	939.8

(Continued on next page)

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a] (Continued)

Agency, Type and Model	1983		1984[E]		1985[E]	
	No.	Cost	No.	Cost	No.	Cost
NAVY (Continued)						
C-2 Greyhound	8	$ 285.8	6	$ 197.1	8	$ 198.8
C-9B Skytrain II	2	16.2	—	—	(c)	40.0
CH-53E Super Stallion	11	233.4	11	204.9	10	320.5
E-2C Hawkeye	6	301.8	6	318.0	6	365.0
EA-6B Prowler	6	311.0	8	503.9	6	395.8
EC-130Q Hercules	—	38.4	—	0.4	—	—
F-14A Tomcat	24	976.1	24	1,016.9	24	985.8
F/A-18 Hornet	84	2,599.5	84	2,501.0	84	2,797.6
KC-130T Hercules	2	42.1	2	53.3	—	—
P-3C Orion	6	300.6	5	301.7	9	483.3
SH-60B Seahawk LAMPS	27	797.2	21	526.8	18	481.3
SH-2F Seasprite (LAMPS MK-I)	18	157.2	6	61.4	6	70.0
T-34C Mentor	30	25.9	—	4.8	—	—
TH-57 Sea Ranger	21	24.5	21	31.0	36	24.4
AH-IT Sea Cobra	—	—	—	17.8	22	214.4
Adversary Aircraft	—	—	4	31.9	8	73.1
E-6A (ECX)	—	—	—	97.7	—	—
FEWSG	—	—	1	21.1	—	—

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget, (Annually).
NOTE See Research and Development Chapter for aircraft program RDT&E authorization data.
a Total Obligational Authority for procurement, including initial spares.
b Includes ground stations.
c Quantity to be determined: 2 to 6 used aircraft.
E Estimate.

ACTIVE U.S. MILITARY AIRCRAFT IN CONTINENTAL U.S. [a]

Fiscal Years 1975-1985

Fiscal Year	Total	Fixed Wing Aircraft				Helicopter
		Total	Jet	Turboprop	Piston	
1975	19,889	12,751	9,526	1,298	1,927	7,138
1976	19,775	12,126	9,255	1,511	1,360	7,649
1977	18,670	11,625	9,168	1,382	1,075	7,045
1978	18,931	11,748	8,898	1,794	1,056	7,183
1979	18,526	11,365	8,656	1,859	850	7,161
1980	18,969	11,362	8,794	1,869	699	7,607
1981	19,363	11,645	9,111	1,943	591	7,718
1982	21,728	12,063	9,647	1,900	516	9,665
1983[p]	21,757	12,052	9,642	1,919	491	9,705
1984[E]	21,613	12,067	9,701	1,945	421	9,546
1985[E]	21,828	12,143	9,767	1,956	420	9,685

Source: Department of Defense, Office of the Secretary of Defense, reported in "FAA Aviation Forecasts" (Annually).
a Includes Army, Air Force, Navy, and Marine regular service aircraft, as well as Reserve and National Guard aircraft.
p Preliminary.
E Estimate.

DEPARTMENT OF DEFENSE
OUTLAYS FOR AIRCRAFT PROCUREMENT

By Agency
Fiscal Years 1960-1985
(Millions of Dollars)

Year	TOTAL AIRCRAFT PROCUREMENT	Air Force	Navy	Army
1960	$ 6,272	$ 4,414	$1,765	$ 93
1961	5,898	3,926	1,832	140
1962	6,659	4,387	2,102	170
1963	6,309	3,747	2,328	234
1964	6,053	3,894	1,859	300
1965	5,200	3,115	1,739	346
1966	6,635	4,074	2,021	540
1967	8,411	4,842	2,607	962
1968	9,462	5,079	3,244	1,139
1969	9,177	5,230	2,821	1,126
1970	7,948	4,623	2,488	837
1971	6,631	3,960	2,125	546
1972	5,927	3,191	2,347	389
1973	5,066	2,396	2,557	113
1974	5,006	2,078	2,806	122
1975	5,484	2,211	3,137	136
1976	6,520	3,323	3,061	136
Tr. Qtr	1,557	859	672	26
1977	6,608	3,586	2,721	301
1978	6,971	3,989	2,602	380
1979	8,836	5,138	3,140	558
1980	11,124	6,647	3,689	788
1981	13,193	7,941	4,397	855
1982	16,793	9,624	5,872	1,297
1983	21,013	11,799	7,490	1,724
1984[E]	24,961	13,839	9,139	1,983
1985[E]	30,504	17,960	9,735	2,809

Source: Department of Defense Budget (Annually).
NOTE: Detail may not add to totals because of rounding.
E Estimate.

SPECIFICATIONS OF U.S. MILITARY AIRCRAFT ON ORDER OR IN PRODUCTION AS OF 1983

Primary Mission, DOD Designation, & Popular Name	Manufacturer	U.S. Military Service	Crew	Empty Weight (000's lbs)	Engines	Performance Typical for Primary Mission	Remarks
ATTACK							
A-6E Intruder	Grumman	USN USMC	2	27	2 × P&W J52	Mach.8 sea level	Also EA-6A B & KA-6D
A-7K Corsair 2	LTV Aero	ANG	2	21	1 × All TF 41	Subsonic	Trainer; combat capable
AV-8B Harrier 2	MDC Br Aer	USMC	1	13	1 × RR F402	Mach.9 +	Graphite epoxy super-critical wing
A-10A Thunderbolt 2	Fairchild	USAF	1	22	2 × GE TF34	Max. speed 400kt	Close air support
A-10B	Fairchild	USAF	2	23	2 × GE TF34	Max. speed 400kt	Combat ready trainer
BOMBERS							
B-1B	Rockwell	USAF	4	182	4 × GE F101	High subsonic penetration	Intercont'l range, unrefueled
ELECTRONIC WARFARE							
EA-6B Prowler	Grumman	USN USMC	4	33	2 × P&W J52	493n.m. standoff radius	Tactical jamming system
FIGHTERS							
F-5E Tiger 2	Northrop	USAF USN	1	10	2 × GE J85	Mach 1.6 class	More than 1,200 F-5E Fs delivered
F-5F Tiger 2	Northrop	USAF USN	2	11	2 × GE J85	Mach 1.5 class	2-seat trainer fighter
F-14A Tomcat	Grumman	USN	2	40	2 × P&W TF30	Mach 2.3 class	Missile, gun fleet defense
F-15C Eagle	MDC	USAF	1	29	2 × P&W F100	Mach 2.5 class	Air superiority, defense, guns, missiles; 15D = 2 seat trainer
F-16 Fighting Falcon	GD	USAF	1-2	15	1 × P&W F100	Mach 2 + class	Multircle fighter; fully fly-by-wire, missiles, guns
F A-18 Hornet	MDC Northrop	USN USMC	1	24	2 × GE F404	Mach 1.8 +	Missiles, guns; also export
F-20 Tigershark	Northrop	Export	1	12	1 × GE F404	Mach 2 class	Multirole; adv. avionics
RECONNAISSANCE							
TR-1 U-2	Lockheed	USAF	1	18	1 × P&W J75	Altitudes 70,000 ft +	High alt. tactical recon.
PATROL ANTI-SUBMARINE WARFARE							
P-3C Orion	Lockheed	USN	10	67	4 × All T56	14 + hr. mission duration	Torpedoes, missiles, sono-buoys, mines; also export
EARLY-WARNING							
E-2C Hawkeye	Grumman	USN	5	38	2 × All T56	6 hr. mission duration	AEW command & control; passive detection
E-3A AWACS	Boeing	USAF NATO	17	188	4 × P&W TF33	Long range, subsonic	Surveillance radar, command, control
CARGO-TRANSPORT							
C-2A Greyhound	Grumman	USN	2	34	2 × All T56	Cruise 260kt; 1,560n.m. range	First Navy multi-year procurement contract
C KC-130 Hercules	Lockheed	USAF, USN, Export	4	74-78	4 × All T56	Cruise 360mph; 2,046n.m. range	92-128 troops or 39-43 thsnd. lbs.
C-5B Galaxy	Lockheed	USAF	5	351	4 × GE TF39	Cruise 560 mph; 2,370n.m. range	Global strategic logistics; 208,000 lb. cargo capacity
C-9B Skytrain 2	MDC	USN	5-7	65	2 × P&W JT8D	Cruise 570mph; 3,300n.m. range	90 pass. or 34,444 lb. cargo
C-12 Huron	Beech	Army USAF	2	8	2 × PWC PT6A	Cruise 259kt. at 14,000ft.	10-place; pass. or cargo
KC-10A Extender	MDC	USAF	5	241	3 × GE CF6	600 + mph.	Tanker or cargo
C-20A G3	Gulfstream	USAF	2	32	2 × RR Spey	Mach.77; 3,650 n.m.	VIP transport; 14 pass.
TRAINING							
T-34C Turbo Mentor	Beech	USN	2	3	1 × PWC PT6A	Cruise 211kt. at 17,500ft	Simulates jet a.c; weapons
HELICOPTERS							
AH-1T Sea Cobra	Bell-Textron	USN	2	9	2 × PWC T400	Max 195 mph; 360 mi.	TOW w 20 mm gun
AH-1S Cobra	Bell-Textron	Army	2	6	1 × Lyc T53	Max 195 mph; 380 mi.	TOW w mini gun
AH-64 Apache	Hughes-MDC	Army	2	11	2 × GE T700	Max 189 mph; 372 mi.	Attack helicopter
CH-53E Super Stallion	Sikorsky-UTC	USN	3	32	3 × GE T64	Max 196 mph; 710 mi.	55 passengers, aux. tanks
SH-2F Seasprite	Kaman	USN	3	7	2 × GE T58	Max 165 mph; 425 mi.	LAMPS Mk.I helicopter
TH-57A Sea Ranger	Bell-Textron	USN	2	2	1 × Ail 250	Max 140 mph; 400 mi.	Primary trainer
SH-60B Seahawk	Sikorsky-UTC	USN	3	14	2 × GE T700	Max 171 mph	ASW
UH-60A Black Hawk	Sikorsky-UTC	Army USAF	3	11	2 × GE T700	Max 184 mph; 389 mi.	UTTAS

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology Magazine."

CODE
Manufacturers: MDC = McDonnell Douglas; Br.Aer. = British Aerospace; GD = General Dynamics.
U.S. Military Service: USN = Navy; USMC = Marine Corps; USAF = Air Force; ANG = Air National Guard.
Engines: P&W = Pratt & Whitney; PWC = Pratt & Whitney of Canada; All = Detroit Diesel Allison Div. of General Motors; Lyc = Avco Lycoming; RR = Rolls Royce.

missile programs

In line with the upward activity trend that began in 1978, industry production of missile systems increased in 1983. The Bureau of the Census reports 1983 sales of missile systems and parts, excluding propulsion and R&D, at a record level of $6.1 billion, compared with $5.7 billion in the previous year.

The industry received new orders totaling $7.2 billion during 1983 and the missile backlog increased by more than $1 billion, from $7.2 billion in 1982 to $8.3 billion at the end of 1983.

The Aerospace Industries Association estimates 1983 total missile sales—including propulsion units and RDT&E—at $9.1 billion, up from $8.8 billion in 1982.

Indications that the upward trend will continue in near-future years are contained in Department of Defense budget data for Air Force and Army missile procurement outlays (Navy data are not available). USAF/Army missile outlays for Fiscal Year 1984 are estimated at $7 billion, an increase of more than $2 billion above the previous year's level. Air Force procurement is $5 billion (up $1.6 billion) and Army outlays are $2 billion (up $385 million). An even larger increase is projected for FY 1985, with total USAF/Army outlays estimated at $9.1 billion; that represents a 31 percent gain over FY 1984. The projection shows $6.6 billion for USAF missile outlays and $2.5 billion for Army procurement.

DoD's largest missile program is the Air Force 10-warhead Peacekeeper (MX) intercontinental ballistic missile. For FY 1984, Congress authorized approximately $2.1 billion for production of the Peacekeeper and an additional $2 billion for development and test of the missile. The production funding provided for the first 21 of a planned 100 missiles. Initial operational service of the Peacekeeper is targeted for 1987.

On the basis of procurement plans announced by DoD, missile programs with the highest FY 1984 dollar value—other than Peacekeeper—are the Army's Patriot long-range air defense missile system ($936 million); the Navy's Standard shipboard air defense system ($626 million); the USAF's Ground Launched Cruise Missile ($592 million); the Navy's Trident 1 submarine-launched ballistic missile ($550 million); the Army's Multiple Launch Rocket System ($545 million); the Army's Pershing II battlefield ballistic missile ($429 million); and the Air Force's Air Launched Cruise Missile ($422 million).

Other major missiles in production during 1983/84 include:

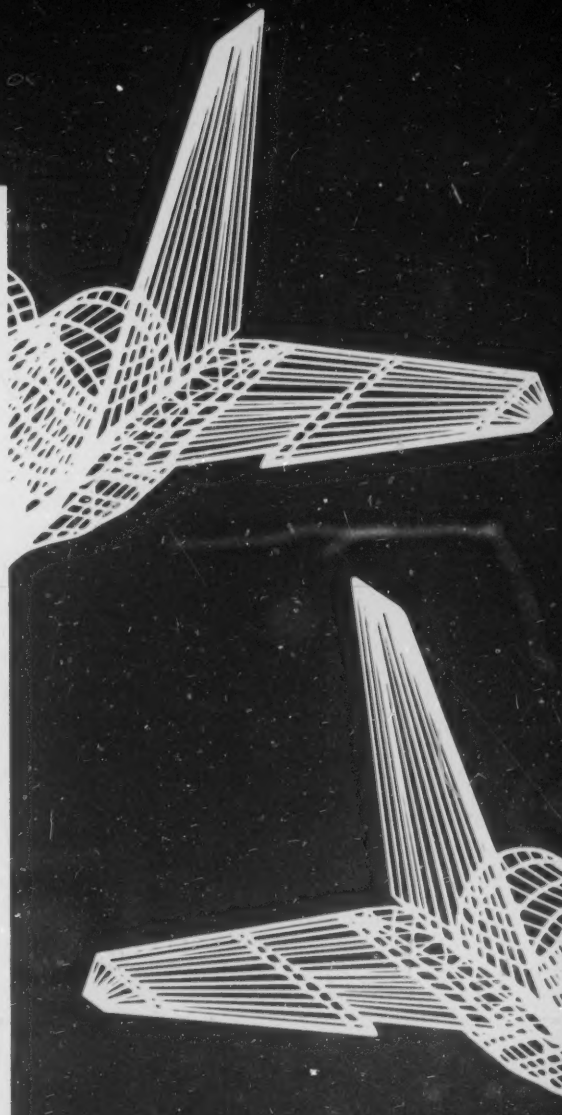
Army. The Laser Hellfire, a long-range helicopter-launched antiarmor weapon for both Army and Navy use; the US Roland, an American-built version of the highly mobile, short-range defense weapon for use against low-altitude targets; the man-portable Stinger, a short-range anti-aircraft missile; the Army/Marine Corps TOW 2, an antitank weapon launched from helicopters or ground vehicles; and the Copperhead laser-guided artillery projectile.

Navy. The Tomahawk long-range

cruise missile, capable of being deployed from a variety of air, surface ship, submarine and land platforms; the HARM (High Speed Anti-Radiation Missile), an air-to-surface weapon designed to destroy enemy land-based or sea-based radars; the Phoenix long-range air-to-air missile; the Marine Corps Hawk mobile air defense system, also operational with Army and NATO units; the Harpoon air-launched and sub-launched anti-shipping cruise missile, also being procured for Air Force use; the Laser Maverick short-range air-to-surface weapon for Marine Corps use in close support operations; and several versions of the infrared-guided Sidewinder and the radar-guided Sparrow missiles carried aboard Navy and USAF aircraft.

Air Force. In addition to the Peacekeeper and the cruise missile programs, production missiles under USAF cognizance include the Imaging Infrared Maverick air-to-surface missile, also being produced for Navy use; and the Rapier, an American-built version of the British short-range infrared-guided air-to-air weapon, for use on both Air Force and Navy aircraft.

Among missiles in research and development status are the AMRAAM (Advanced Medium-Range Air-to-Air Missile), a USAF/USN replacement for the Sparrow, planned for production status under FY 1985 funding; the Navy Trident 2 advanced submarine-launched ballistic missile; the Navy RAM (Rolling Airframe Missile), a system for shipboard defense against enemy antiship missiles; the Army Advanced Antitank Weapon System, a man-portable infantry weapon; and the Air Force MV (Miniature Vehicle), an antisatellite interceptor boosted by a two-stage rocket, designed for launch from fighter aircraft.



MISSILE PROGRAM PROCUREMENT INCLUDING INITIAL SPARES[a]

Fiscal Years 1983, 1984 and 1985
(Millions of Dollars)

Agency, Type and Model	1983		1984[E]		1985[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
ALCM	330	$502.4	240	$ 422.3	—	$ 80.4
AMRAAM[b]	—	—	—	57.9	174	431.0
GLCM	84	455.4	120	592.0	120	580.1
IIR Maverick	900	248.9	1,980	303.1	4,690	610.7
Peacekeeper (M-X)	—	—	21	2,157.4	40	3,171.9
Rapier	4	148.0	12	62.9	8	7.6
Target Drones	—	44.4	—	30.9	—	38.2
NAVY						
Harm[b]	289	$164.1	722	$ 379.3	1,674	$ 656.5
Harpoon[b]	223	235.5	313	290.0	439	402.3
Hawk[e]	211	76.1	400	97.7	500	126.7
Laser Maverick	90	41.4	185	36.2	600	110.7
Phoenix	108	247.3	265	335.9	400	481.8
RAM	—	—	—	19.0	30	18.0
Sidewinder[b]	2,420	141.4	2,050	135.6	1,000	71.2
Sparrow[b]	1,807	341.4	1,700	342.1	1,250	260.5
Standard	1,150	608.1	1,190	625.6	1,380	732.0
Tomahawk	51	221.3	124	346.0	180	589.0
Trident I	6[illegible]	633.7	52	549.9	—	163.0
Trident II	—	—	—	—	—	162.9
ARMY						
Air Defense Targets	—	$ 11.1	—	$ 12.4	—	$ 20.8
Copperhead	1,100	55.0	1,415	71.3	2,253	102.8
Laser Hellfire[d]	3,971	247.4	4,870	235.5	6,464	263.0
MLRS	23,640	444.4	36,000	545.4	50,472	561.9
Patriot	287	844.8	440	963.5	585	1,202.4
Pershing II	91	453.6	70	429.1	93	472.2
Roland	—	71.3	—	—	—	—
Stinger[f]	2,566	240.3	1,956	182.8	3,316	298.2
TOW 2[c]	13,000	162.1	20,200	217.2	21,822	322.5
Remotely Piloted Vehicles (RPVs)	—	—	—	—	41[g]	161.3

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE See Research and Development Chapter for missile program RDT&E authorization data.
E Estimate.
a Total Obligational Authority.
b Navy and Air Force funding.
c Army and Marine Corps funding.
d Army and Navy funding.
e Marine Corps funding.
f Army, Marine Corps and Air Force funding.
g Includes ground control stations.

MAJOR MISSILES
RESEARCH, DEVELOPMENT, PRODUCTION, OPERATION

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-AIR					
AMRAAM	USAF/USN	D	Hughes	Hercules	Hughes
Falcon-4F/G	USAF	O	Hughes	Thiokol	Hughes
Phoenix-54A	USN	O	Hughes	Hercules	Hughes
Phoenix-54C	USN	P	Hughes	Hercules	Hughes
Sidewinder-9H	USN	O	NASC	Bermite/ Hercules	Ford Aero./ Raytheon
Sidewinder-9J	USAF	O	Ford Aerospace	Hercules/ Aerojet	Ford Aerospace
Sidewinder-9L	USN/USAF	O	NASC	Bermite/ Hercules	Raytheon/ Ford Aero.
Sidewinder-9M	USN/USAF	P	NASC	Thiokol/ Hercules	Raytheon/ Ford Aero.
Sidewinder-9N	USAF	O	Ford Aero.	—	Ford Aero.
Sidewinder-9P	USAF	O	Ford Aero.	Hercules/ Aerojet	Ford Aero.
Sparrow-7E	USN/USAF	O	Raytheon	Hercules/ Aerojet	Raytheon
Sparrow-7F	USN/USAF	O	NASC	Hercules	Raytheon/GD
Sparrow-7M	USN/USAF	P	Raytheon/GD	Hercules	Raytheon/GD
AIR-TO-SURFACE					
ALCM	USAF	P	Boeing	Williams International	McDonnell Douglas
HARM	USN/USAF	P	Texas Instr.	Thiokol	Texas Instr.
Harpoon*	USN/USAF	P,O	McDonnell Douglas	Teledyne CAE	TI/IBM/LSI/ Northrop
GBU-15	USAF	P	Rockwell	—	Rockwell/ Hughes
Maverick-65A/B	USAF	P,O	Hughes	Thiokol/Aerojet	Hughes
Maverick-65D	USAF	P,O	Hughes	Thiokol/Aerojet	Hughes
Maverick-65E	USMC	P	Hughes	Thiokol/Aerojet	Hughes
Maverick-65F	USN	D	Hughes	Thiokol/Aerojet	Hughes
Shrike	USN/USAF	O	NWC/PMTC	Aerojet/ Hercules	Texas Instruments
SRAM	USAF	O	Boeing	Lockheed	Singer
Standard ARM	USN/USAF	O	GD	NOSIH	GD
Walleye 1	USN	O	Martin Marietta/ Hughes	—	Martin Marietta/ Hughes
Walleye 1ER	USN	R,D	NAC	—	NAC
Walleye 2	USN	O	NAC	—	NAC
Walleye 2 (ER/DL)	USN	O	NAC	—	NAC

*Also Surface-to-Surface

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-SURFACE (Cont'd.)					
AGM-130A	USAF	D	Rockwell	To be det'd	Hughes/Rockwell
AGM-130B	USAF	D	Rockwell	To be det'd	Hughes/Rockwell
ANTI-SUBMARINE					
Subroc	USN	O	Goodyear Aerospace	Thiokol	Singer
SURFACE-TO-AIR					
Chaparral	Army	O	Ford Aerospace	Hercules/ Bermite	GE/Raytheon
Improved Chaparral	Army	P,O	Ford Aerospace	Bermite	Ford Aerospace
Hawk	Army	P,O	Raytheon	Aerojet	Raytheon
Patriot	Army	P	Raytheon	Thiokol	Raytheon
RAM	USN	D	General Dynamics	Bermite/ Hercules/ Thiokol	General Dynamics
Redeye	Army/ USMC	O	General Dynamics	Atlantic Research	General Dynamics
Roland	Army	P	Hughes/ Boeing	Hercules	Hughes/ Boeing
Sea Sparrow	USN	P,O	Raytheon/ GD	Aerojet/ Hercules	Raytheon/ GD
Standard MR (SM-1)	USN	P,O	General Dynamics	Aerojet/ Hercules	General Dynamics
Standard MR (SM-2)	USN	P,O	General Dynamics	Aerojet/ Hercules/ Thiokol	General Dynamics
Standard ER (SM-1)	USN	O	General Dynamics	Atlantic Research	General Dynamics
Standard ER (SM-2)	USN	P,O	General Dynamics	Atlantic Research/ Thiokol	General Dynamics
Stinger	Army/ USMC	P,O	General Dynamics	Atlantic Research	General Dynamics
Tartar	USN	O	GD	Aerojet	GD
Terrier	USN	O	General Dynamics	Atlantic Research	General Dynamics
SURFACE-TO-SURFACE					
Minuteman 2	USAF	O	AFLC Hill AFB	Thiokol/Aerojet/ Hercules/	Rockwell Autonetics
Minuteman 3	USAF	O	AFLC Hill AFB	Thiokol/ Aerojet	Rockwell Autonetics

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
SURFACE-TO-SURFACE (Cont'd.)					
Peacekeeper (MX)	USAF	R,D,	BMO/TRW/ Martin Marietta	Thiokol/Avco/ Aerojet/ Hercules/ Rocketdyne	Autonetics/ Northrop/ Honeywell
Polaris A3	USN	O	Lockheed MSC	Aerojet/ Hercules	GE/Hughes/ MIT/Raytheon
Poseidon C3	USN	O	Lockheed MSC	Thiokol/ Hercules	GE/MIT/ Raytheon/ Hughes
Tomahawk (SLCM)	USN	P	General Dynamics	Williams International	McDonnell Douglas
Tomahawk (GLCM)	USAF	P	General Dynamics	Williams International	McDonnell Douglas
Titan 2	USAF	O	AFLC Hill AFB	Aerojet	GM/Delco Electronics
Trident C4	USN	P,O	Lockheed MSC	Hercules/ Thiokol	GE/Draper/ Raytheon/ Hughes
BATTLEFIELD SUPPORT AND ANTIARMOR					
Copperhead (CLGP)	Army	P	Martin Marietta	—	Martin Marietta
Dragon	Army	P,O	Raytheon/ Kollsman	MDC/Hercules/ Raytheon	Raytheon
Hellfire	Army/ USMC	P	Rockwell	Thiokol	Martin Marietta
Lance	Army	O	LTV Aero.	RI	E-Systems/ Sys-Donner/Arma
MLRS	Army	P,O	LTV Aero.	Atlantic Res.	—
Pershing 1A	Army	O	Martin Marietta	Thiokol	Bendix
Pershing 2	Army	P	Martin Marietta	Hercules	Goodyear Aerospace
Shillelagh	Army	O	Ford Aerospace	Hercules	Ford Aerospace
TOW	Army/ USMC	P,O	Hughes	Hercules/ Thiokol	Emerson Electric
ITOW	Army	P	Hughes	Hercules	Emerson El.
TOW2	Army	P	Hughes	Hercules	Emerson El.

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology Magazine."
Status: R—Research; D—Development; P—Production; O—Operational.

Abb: AFB - Air Force Base; AFLC - Air Force Logistics Cmd.; BMO - Ballistic Missile Office; GD - General Dynamics; GE - General Electric; LSI - Lear Siegler; MDC - McDonnell Douglas; MIT - Massachusetts Institute of Technology; NAC - Naval Avionics Center; NASC - Naval Air Systems Command; NWC - Naval Weapons Center; PMTC - Pacific Missile Test Center; RI - Rockwell International; TI - Texas Instruments; USAF - United States Air Force; USMC - United States Marine Corps; USN - United States Navy

DEPARTMENT OF DEFENSE OUTLAYS FOR MISSILES

Fiscal Years 1960-1985
(Millions of Dollars)

Year	TOTAL MISSILE OUTLAYS	Procurement[a]	Research, Development, Test and Evaluation
1960	$5,086	$3,027	$2,059
1961	5,997	2,972	3,025
1962	6,219	3,442	2,777
1963	6,058	3,817	2,241
1964	5,929	3,577	2,352
1965	3,997	2,096	1,901
1966	3,870	2,069	1,801
1967	4,432	1,930	2,502
1968	4,741	2,219	2,522
1969	4,919	2,509	2,410
1970	5,108	2,912	2,196
1971	5,148	3,140	2,008
1972	5,166	3,009	2,157
1973	5,061	3,023	2,038
1974	5,141	2,981	2,160
1975	5,065	2,889	2,176
1976	4,591	2,296	2,295
Tr. Qtr.	922	402	520
1977	5,040	2,781	2,259
1978	NA	1,794	NA
1979	NA	2,084	NA
1980	NA	2,461	NA
1981	NA	3,513	NA
1982	NA	4,338	NA
1983	NA	4,983	NA
1984[E]	NA	6,998	NA
1985[E]	NA	9,135	NA

Source: Department of Defense Budget (Annually).
a Effective 1978, for Army and Air Force only; Navy missile procurement outlays data no longer available as separate budget item.
E Estimate.
NA Not Available.

DEPARTMENT OF DEFENSE
OUTLAYS FOR MISSILE PROCUREMENT[a]

By Agency
Fiscal Years 1960-1985
(Millions of Dollars)

Year	TOTAL MISSILE PROCUREMENT	Air Force	Navy	Army
1960	$3,027	$2,021	$423	$ 583
1961	2,972	1,922	493	557
1962	3,442	2,385	593	464
1963	3,817	2,676	718	423
1964	3,577	2,100	981	496
1965	2,096	1,320	522	254
1966	2,069	1,313	512	244
1967	1,930	1,278	432	220
1968	2,219	1,388	436	395
1969	2,509	1,382	534	593
1970	2,912	1,467	702	743
1971	3,140	1,497	791	852
1972	3,009	1,334	831	844
1973	3,023	1,454	628	941
1974	2,981	1,537	541	903
1975	2,889	1,602	615	672
1976	2,296	1,549	584	163
Tr. Qtr.	402	347	148	(93)
1977	2,781	1,502	905	374
1978	1,794	1,376	NA	418
1979	2,084	1,537	NA	547
1980	2,461	1,810	NA	651
1981	3,513	2,367	NA	1,146
1982	4,338	3,069	NA	1,269
1983	4,983	3,383	NA	1,600
1984[E]	6,998	5,013	NA	1,985
1985[E]	9,135	6,576	NA	2,559

Source: Department of Defense Budget (Annually).
NOTE: Detail may not add to totals because of rounding.
a Effective 1978, for Army and Air Force only; Navy missile procurement outlays data no longer available as separate budget item.
E Estimate.
NA Not Available.

ORDERS, SALES, AND BACKLOG
MISSILE SYSTEMS AND PARTS[a]

Calendar Years 1968-1983
(Millions of Dollars)

Year	SALES-Current Dollars	SALES-Constant Dollars[c]
1968	$2,812	$3,312
1969	2,676	3,031
1970	2,826	3,029
1971	2,641	2,723
1972	3,335	3,335
1973	3,391	3,261
1974	3,454	2,978
1975	3,548	2,696
1976	3,237	2,242
1977	3,118	2,009
1978	3,264[b]	1,941
1979	3,706	1,988
1980	3,971	1,893
1981	4,662	1,971
1982	5,676[r]	2,215
1983	6,095	2,412

Year	NET NEW ORDERS	BACKLOG AS OF DECEMBER 31
1968	$2,971	$3,218
1969	1,965	2,511
1970	3,041	2,721
1971	3,264	3,344
1972	3,633	3,642
1973	3,617	3,868
1974	4,059	4,473
1975	3,655	4,580
1976	3,036	4,379
1977	3,280	4,541
1978	2,948	4,581
1979	3,724	4,916
1980	4,961	5,558
1981	6,030	6,749[r]
1982	6,126	7,199[r]
1983	7,155	8,264

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).
a Prior to 1980, includes space vehicle systems and parts sold to other than U.S. Government customers.
b AIA estimate based on MQ37D.
c Based on aerospace composite price deflator (1972 = 100).
r Revised.

ORDERS, SALES, AND BACKLOG ENGINES AND PROPULSION UNITS FOR MISSILES AND SPACE VEHICLES

Calendar Years 1968-1983
(Millions of Dollars)

Year	SALES-Current Dollars			SALES-Constant Dollars[b]		
	TOTAL	Military[a]	Non-Military	TOTAL	Military[a]	Non-Military
1968	$ 907	$ 676	$231	$1,068	$ 796	$272
1969	702	667	35	795	755	40
1970	640	398	242	686	427	259
1971	605	596	9	624	614	9
1972	607	596	11	607	596	11
1973	627	607	20	603	584	19
1974	649	633	16	559	546	14
1975	643	626	17	489	476	13
1976	641	621	20	444	430	14
1977	787	757	30	507	488	19
1978	792	760	32	471	452	19
1979	952	915	37	511	491	20
1980	939	661	278	448	315	133
1981	1,204	786	418	509	332	177
1982[r]	1,555	899	656	607	351	256
1983	1,796	923	873	661	339	321

Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military[a]	Non-Military	TOTAL	Military[a]	Non-Military
1968	$ 823	$ 743	$ 80	$ 535	$ 406	$129
1969	668	645	23	497	485	12
1970	759	743	16	617	610	7
1971	508	499	9	520	513	7
1972	758	742	16	671	659	12
1973	581	563	18	625	615	10
1974	702	680	22	678	662	16
1975	496	481	15	531	517	14
1976	783	763	20	673	659	14
1977	727	693	34	613	595	18
1978	967	919	48	788	754	34
1979	1,187	1,141	46	1,024	980	44
1980	1,121	653	568	1,284	871	413
1981	1,284	746	538	1,343[r]	828[r]	515[r]
1982	2,107	1,145	962	1,896[r]	1,074[r]	822[r]
1983	1,592	912	680	1,690	1,059	631

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).
a Prior to 1980, includes figures for nonmilitary U.S. Government customers.
b Based on aerospace composite price deflator (1972 = 100).
r Revised.

space programs

The upward trend in U.S. space activity continued in Fiscal Year 1984, according to federal budget data. Space budget authority for the Department of Defense, NASA, the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce and other government agencies rose to $16.7 billion in FY 1984, an increase of more than 11 percent above the FY 1983 level of $15 billion.

The FY 1984 increase was due almost entirely to the rapidly growing military space program. DoD's budget authority for FY 1984 amounted to $10.6 billion, compared with the previous year's $8.5 billion. NASA received $6.6 billion, up from $6.3 billion in FY 1983. With NOAA operating both weather/environment and Earth resources monitoring operational satellite systems, the Commerce allocation increased to $206 million, up $20 million.

In constant dollars, FY 1984 marked the highest level of space budget authority since 1968. However, it remained well below the levels of the Apollo development years.

The U.S. conducted 22 space launches in calendar year 1983, including four Space Shuttle flights and 18 launches of expendable boosters; the total was four more than in the previous year. Six of the flights delivered multiple payloads; in all, there were 31 payloads sent into orbit, including four flights of the Shuttle itself, technically an orbiting research payload.

Worldwide launches into Earth orbit or beyond numbered 127, six more than in 1982. The Soviet Union conducted 98 launches, three fewer than in the previous year. The year's other seven launches were made by Japan (3), the European Space Agency (2), India (1) and the People's Republic of China (1). The all-time total of successful launches reached 2,513 of which 1,636—65 percent—were made by the Soviet Union. The U.S. total at year-end 1983 was 814.

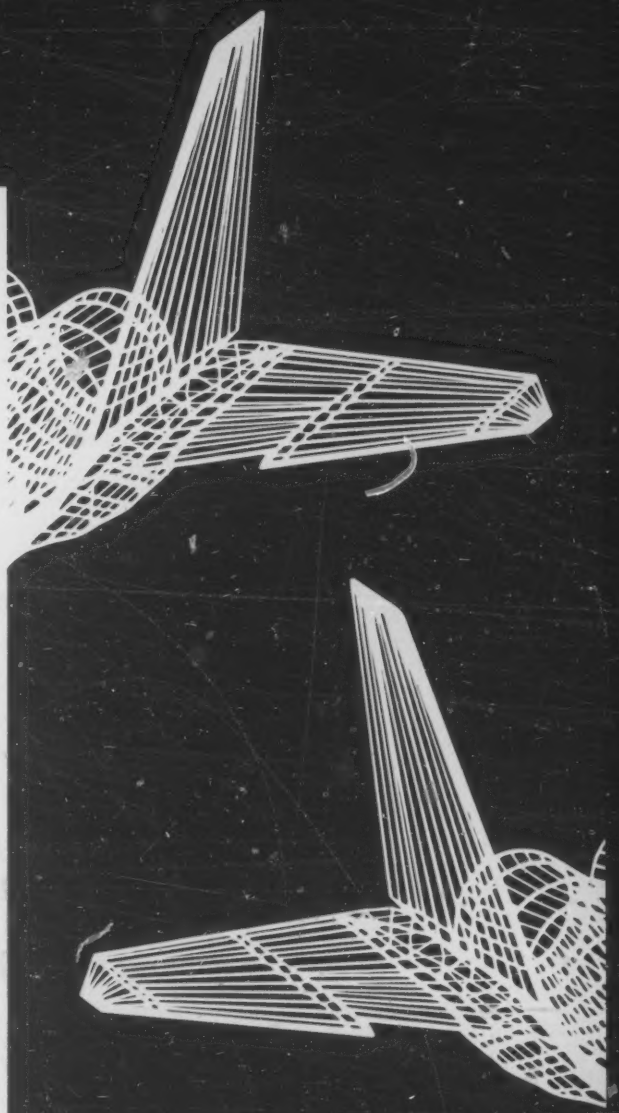
Among the payloads orbited were 9 classified DoD-launched space systems; unclassified systems launched by DoD were Navstar 8, a navigational satellite of the Global Positioning System, and DMSP-7, the second of an advanced series of spacecraft in the Defense Meteorological Satellite Program.

NASA launched two of its own spacecraft, the Infrared Astronomical Satellite and the TDRS-1, the first of three Tracking and Data Relay Satellites. NASA additionally launched nine communications satellites for commercial customers: Satcom 6 and 7, elements of the RCA commercial communications network; Galaxy 1 and 2, for Hughes Communications, Inc.; Intelsat V F-6, for the International Communications Satellite Organization; Anik C-2, for the Telesat Canada domestic satellite system; Palapa B-1 and Insat 1B for the governments of Indonesia and India, respectively; and Telstar 3A, for American Telephone and Telegraph Company. NASA also delivered five spacecraft for agencies of the U.S. and foreign governments; the NOAA-8 and GOES-6 weather/environmental satellites for NOAA; the Exosat scientific satellite for the European Space Agency; the West German SPAS-01 research satellite; and a scientific satellite for the U.S.

Air Force.

NASA's principal development program is the permanently manned space station, also being studied—by Congressional mandate—as an initially-unmanned platform; definition studies began in 1984 toward operational status in the early 1990s. In preliminary development are two space station-related elements of the Space Transportation System, the Orbiting Maneuvering Vehicle and the Orbital Transfer Vehicle. Among other major programs in development or planned for early development are the Space Telescope, an advanced astronomical observatory scheduled for 1986 launch; Galileo, a Jupiter orbiter/probe also targeted for 1986 launch; the Solar Optical telescope, to be used aboard the Space Shuttle beginning in the latter 1980s; the Advanced Communications Technology Satellite, designed to increase satellite communications capacity; the Venus Radar Mapper, to be launched in 1989; the Advanced X-ray Astrophysics Facility and the Ocean Topography Experiment (TOPEX).

Among unclassified military space programs are the Navstar Global Positioning System and the advanced Defense Meteorological Satellite Program, both planned for fully operational status in 1985; the DSCS-III advanced communications network; the Milstar extremely high frequency, highly survivable communications satellite; and a program—designated SLV-X—for development of a new, standardized expendable launch vehicle. In FY 1984, DoD started work on the Strategic Defense Initiative, a comprehensive investigation of technologies that might enable future development of a defensive system capable of intercepting ballistic missiles after they have been launched.



U.S. SPACECRAFT RECORD[a]

Calendar Years 1957-1983

Year	Earth Orbit[b]		Earth Escape[b]		Year	Earth Orbit[b]		Earth Escape[b]	
	Success	Failure	Success	Failure		Success	Failure	Success	Failure
1957	0	1	0	0	1972	33	2	8	0
1958	5	8	0	4	1973	23	2	3	0
1959	9	9	1	2	1974	27	2	1	0
1960	16	12	1	2	1975	30	4	4	0
1961	35	12	0	2	1976	33	0	1	0
1962	55	12	4	1	1977	27	2	2	0
1963	62	11	0	0	1978	34	2	7	0
1964	69	8	4	0	1979	18	0	0	0
1965	93	7	4	1	1980	16	4	0	0
1966	94	12	7	1[c]	1981	20	1	0	0
1967	78	4	10	0	1982	21	0	0	0
1968	61	15	3	0	1983	31	0	0	0
1969	58	1	8	1					
1970	36	1	3	0	TOTAL	1,029	134	79	15
1971	45	2	8	1					

Source: NASA, "Aeronautics and Space Report of the President," (Annually).

a Payloads, rather than launchings; some launches account for multiple spacecraft. Includes spacecraft from cooperating countries launched by U.S. launch vehicles.

b The criterion of success or failure used is attainment of earth orbit or earth escape rather than judgment of mission success. "Escape" flights include all that were intended to go at least an altitude equal to lunar distance from the earth.

c This earth-escape failure did attain earth orbit and therefore is included in the earth-orbit success totals.

WORLDWIDE SPACE LAUNCHINGS WHICH ATTAINED EARTH ORBIT OR BEYOND[a]

Calendar Years 1957-1983

Country	Total 1957-1983	1979	1980	1981	1982	1983
TOTAL	2,513	106	105	123	121[r]	127
U.S.S.R.	1,636	87	89	98[r]	101	98
United States	814	16	13	18	18	22
Japan	24	2	2	3	1	3
People's Republic of China	11	—	—	1	1	1
European Space Agency	5	1	—	2	—	2
India	3[r]	—	1	1[r]	—[r]	1
Other[b]	20	—	—	—	—	—

Source: National Aeronautics and Space Administration, "Aeronautics and Space Report of the President," (Annually).

a Number of launchings rather than spacecraft; some launches orbited multiple spacecraft.

b Includes 10 by France, 8 by Italy (5 were U.S. spacecraft), 1 by Australia, and 1 by the United Kingdom.

r Revised.

SUCCESSFUL U.S. LAUNCHES

Calendar Year 1983

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
Jan. 26 IRAS Delta 3910	SCIENTIFIC SATELLITE: to perform first all-sky survey for objects that emit infrared radiation, to provide a catalogue of infrared sources and infrared sky maps. Successfully launched by NASA; a cooperative U.S./United Kingdom/The Netherlands satellite. On-board instruments detected unidentified cold astronomical objects, bands of dust in the solar system, infrared cirrus clouds in interstellar space, infrared radiation from visually inconspicuous galaxies. Spacecraft ceased operation Nov. 21. Still in orbit.
Feb. 9 Defense (3 Satellites) Atlas H	DOD SATELLITES: to develop spaceflight techniques and technology. Spacecraft not announced. All still in orbit.
Mar. 28 NOAA 8 Atlas E	WEATHER OBSERVATION SATELLITE: to launch spacecraft into sun-synchronous orbit of sufficient accuracy to enable spacecraft to make dependable daytime and nighttime meteorological observations of the earth. Search and Rescue (SAR) instruments, provided by Canada and France, capable of detecting and locating existing emergency transmitters operating at designated frequencies. First of advanced Tiros-N (ATN) spacecraft; launched by NASA for National Oceanic and Atmospheric Administration. Stretched version of original Tiros-N series. Spacecraft attitude control problem corrected Apr. 18 and became operational June 20, 1983.
Apr. 4 Challenger (STS 6) TDRS-1 (Apr. 4) Space Shuttle	SPACE TRANSPORTATION SYSTEM: second operational flight, to deploy TDRS-1, to accomplish assigned experiments and test objectives. Successfully accomplished first spacewalk (extravehicular activity, or EVA) in over 9 years, with 3½ hour duration. COMMUNICATIONS SATELLITE: TDRS-1, deployed from cargo bay, is the first of three Tracking and Data Relay Satellites (TDRS). Launch intended to place satellite in a stationary geosynchronous orbit location with sufficient stationkeeping propulsion fuel on-board to meet support requirements and to initiate user support services, and to provide improved tracking and data acquisition services to spacecraft in low earth orbit. IUS-1 (inertial upper stage) anomaly prevented TDRS-1 from being delivered to geosynchronous orbit as planned. Subsequent actions by TDRS-1 attitude control system enabled satellite to arrive at synchronous altitude. Satellite provided support during flight of STS-9/Spacelab-1.
Apr. 11 RCA-Satcom 6 Delta 3924	COMMUNICATIONS SATELLITE: to provide TV, voice channels, and high speed data transmission to Alaska, Hawaii, and contiguous U.S., to replace RCA-Satcom 1 launched in 1975. Second in a new series of communications satellites launched by NASA for RCA.

(Continued on next page)

SUCCESSFUL U.S. LAUNCHES 1983 (Continued)

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
Apr. 15 Defense Titan IIIB	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Reentered Aug. 21.
Apr. 28 GOES 6 Delta 3914	WEATHER OBSERVATION SATELLITE: to provide near-continual high-resolution, visual and infrared imaging over North and South America and surrounding oceans. Successfully launched by NASA for National Oceanic and Atmospheric Administration (NOAA). Joins GOES 5, launched May 1981 as part of two-satellite operational system. Apogee-boost motor fired Apr. 30; arrived on station May 12; turned over to NOAA May 27; became operational Jun. 1.
May 19 Intelsat V F-6 Atlas-Centaur	COMMUNICATIONS SATELLITE: to provide 12,000 voice circuits and 2 color TV channels simultaneously, double the capacity of Intelsat IV-A series. Sixth of a series of nine satellites. Launched by NASA for 108-member-nation International Telecommunications Satellite Organization (INTELSAT). Positioned over Atlantic Ocean.
May 26 EXOSAT Delta 3914	SCIENTIFIC SATELLITE: successfully launched by NASA for the European Space Agency, with sufficient accuracy to allow spacecraft to accomplish its scientific mission of continuous observations of X-ray sources. Returning data.
Jun. 9 Defense (2 Satellites) Atlas H	DOD SATELLITES: to develop spaceflight techniques and technology. Spacecraft not announced. Both still in orbit.
Jun. 18 Challenger (STS 7) Anik C-2 (Jun. 18) Palapa B-1 (Jun. 19) SPAS 01 (Jun. 22) Space Shuttle	SPACE TRANSPORTATION SYSTEM: third operational flight, to launch Anik C-2 (Telesat F) and Palapa B-1, accomplish assigned experiments and test objectives. Successfully deployed both satellites, carried out experiments including launching and recovering SPAS 01. SATELLITES: Anik C-2 (COMMUNICATIONS SATELLITE) successfully launched by NASA for Telesat Canada, for communications coverage over Canada. Palapa B-1 (COMMUNICATIONS SATELLITE) successfully launched for the Republic of Indonesia for domestic communications. SPAS 01 (Shuttle Pallet Satellite) successfully deployed and retrieved, performed scientific experiments, tested remote manipulator arm, and photographed Challenger.
Jun. 20 Defense (2 Satellites) Titon 34D	DOD SATELLITES: to develop spaceflight techniques and technology. Spacecraft not announced. Both still in orbit.
Jun. 27 P83-1 (HILAT) Scout	SCIENTIFIC SATELLITE: launched successfully by NASA for the USAF, to enable the achievement of Air Force mission objectives, to evaluate certain propogation effects of disturbed plasmas on radar and communication systems. Still in orbit.
Jun. 28 Galaxy 1 Delta 3920	COMMUNICATIONS SATELLITE: successfully launched by NASA for Hughes Communications, Inc., with sufficient accuracy to allow spacecraft to achieve stationary geosynchronous orbit.

(Continued on next page)

SUCCESSFUL U.S. LAUNCHES 1983 (Continued)

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
Jul. 14 Navstar 8 Atlas E	NAVIGATION SATELLITE: Global Positioning System satellite, successfully launched and still in orbit.
Jul. 28 Telstar 3A Delta 3920	COMMUNICATIONS SATELLITE: successfully launched by NASA for American Telephone and Telegraph Co., with sufficient accuracy to allow PAM-D (payload assist module) and spacecraft propulsion system to place spacecraft into stationary geosynchronous orbit.
Jul. 31 Defense Titan IIIB	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Aug. 30 Challenger (STS 8) Insat 1B (Aug. 31) Space Shuttle	SPACE TRANSPORTATION SYSTEM: fourth operational flight, to deploy Insat 1B, and to accomplish assigned experiments and test objectives. Successfully deployed satellite from cargo bay. First night launch and landing. COMMUNICATIONS SATELLITE: Insat 1B successfully launched by NASA for Government of India. Stuck solar array corrected. Satellite operational over equator south of India.
Sep. 8 RCA-Satcom 7 Delta 3924	COMMUNICATIONS SATELLITE: successfully launched by NASA for RCA, third in a series of advanced satellites, to replace RCA-Satcom 2, launched in 1976.
Sep. 22 Galaxy 2 Delta 3920	COMMUNICATIONS SATELLITE: second in a series of three satellites successfully launched by NASA for Hughes Communications, Inc., with sufficient accuracy to allow the PAM-D (payload assist module) and spacecraft propulsion system to place spacecraft into a stationary geosynchronous orbit above the equator.
Nov. 18 DMSP 7 Atlas E	WEATHER OBSERVATION SATELLITE: second in a series of the Defense Meteorological Satellite Program (DMSP), to provide full earth observation coverage twice daily. Still in orbit.
Nov. 28 Columbia (STS 9) Space Shuttle	SPACE TRANSPORTATION SYSTEM: fifth operational flight, to verify the Spacelab system and subsystem performance capability, to determine the Spacelab/orbiter interface capability, and to measure the induced environment. Secondary objectives were to obtain scientific, applications and technoloy data from U.S./European multidisciplinary payload and to demonstrate, to user community, broad capability of Spacelab for scientific research. First flight of Spacelab, consisting of a long tunnel and a long module-plus-one pallet, scientific airlock and spacelab window adapter assembly. Carried on Spacelab 1 were more than 70 experiments in five areas of scientific research: astronomy and solar physics, space plasma physics, atmospheric physics and earth observations, life sciences, and materials science. First flight of 6-person crew, first flight of a payload specialist, and first flight of a non-American on a Shuttle mission.

Source: NASA, Historian's Office.

U.S. SPACE LAUNCH VEHICLES

As of 1983

Vehicle and Initial Launch & First Launch of this Modification	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Geo-synch.-Transfer Orbit	Circular Sun-Synch. Orbit
Scout (1960; 1979)	1. Algol IIIA* 2. Castor IIA* 3. Antares IIIA* 4. Altair IIIA*	431.1 285.2 83.1 25.6	255 205[b]	—	155[b]
Delta 2900 Series (Thor-Delta) (1960; 1973)	1. Thor plus 9 TX 354-5* 2. Delta 3. TE 364-4*	912.0 147[c] 44.2 65.8	2,000 1,410[b]	705	1,250[b]
Delta 3900 Series (Thor-Delta)[d] (1960; 1982)	1. Thor plus 9 TX 526-2* 2. Delta	912.0 375[c] 44.2	3,045 2,180[b]	1,275	2,135[b]
Atlas E (1967; 1972)	1. Atlas booster & sustainer	1,722.0	2,090[b,e]	—	1,500[b]
Atlas-Centaur (1962; 1984)	1. Atlas booster & sustainer 2. Centaur	1,913.0 146.0	6,100	2,360[h]	—
Vehicle and Launch Date	**Stages**	**Thrust (Kilo-newtons)**	**Maximum Payload (Kg)[a]**		
			185-Km Orbit	**Direct Geo-synch Orbit**	**Sun-Synch. Transfer Orbit**
Titan IIIB-Agena (1966)	1. LR-87 2. LR-91 3. Agena	2,341.0 455.1 71.2	3,600[b]	—	3,060[b]

(Continued on next page)

U.S. SPACE LAUNCH VEHICLES

As of 1983 (Continued)

Vehicle and Launch Date	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Direct Geo.-Synch. Orbit	Sun Synch. Transfer Orbit
Titan III(34)D/IUS (1983)	1. Two 5½-segment 3.05-m. dia*	11,564.8	14,920	1,850[b]	—
	2. LR-87	2,366.3			
	3. LR-91	449.3			
	4. IUS 1st stage*	275.8			
	5. IUS 2nd stage*	115.7			
Titan III(34)D/ Transtage (1984)	1. Two 5½-segment 3.05-m. dia*	11,564.8	14,920	1,850[b]	—
	2. LR-87	2,366.3			
	3. LR-91	449.3			
	4. Transtage	69.8			
Space Shuttle (reusable) (1981)	1. Orbiter; 3 main engines (SSMEs) fire in parallel with SRBs	1,670[c]	29,500 in full performance configuration (280-420 km orbit)		
	2. Two solid-fueled rocket boosters (SRBs) mounted on external tank (ET) fire in parallel with SSMEs	11,790[c]			

Source: NASA, "Aeronautics and Space Report of the President" (Annually) and NASA Historian's office.

* Solid propellant; all others are liquid.

a Due east launch except as indicated.

b Polar launch.

c Each.

d Maximum performance based on 3920 and 3920/PAM (payload assist module) configurations.

e With dual TE 364-4.

f 96° flight azimuth.

U.S. MANNED SPACE FLIGHT LOG

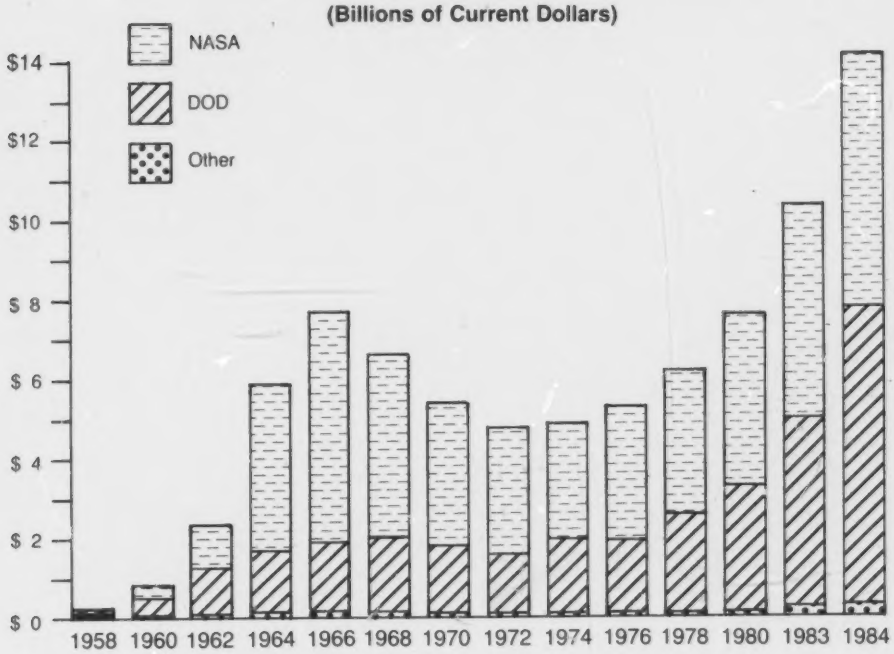
Calendar Year 1983

Launch Date	Spacecraft and Crew	Flight Time (days:hrs:min)	Highlights
Apr. 4	Space Shuttle Challenger (STS 6) Piloted by Astronauts Paul J. Weitz Karol J. Bobko Mission Specialists: Donald H. Peterson Story Musgrave	5:00:24	Sixth flight of Space Transportation System, second operational flight. TDRS-1 satellite deployed from cargo bay. First spacewalk (extravehicular activity, or EVA) in over 9 years.
Jun. 18	Space Shuttle Challenger (STS 7) Piloted by Astronauts Robert L. Crippen Frederick H. Hauck Mission Specialists: John M. Fabian Sally K. Ride Dr. Norman Thagard	6:02:24	Seventh flight of Space Transportation System, third operational flight. Successfully deployed two satellites (Anik C-2 and Palapa B-1); carried out experiments including launching and recovering SPAS 01 (Shuttle Pallet Satellite). Tested remote manipulator arm and photographed Challenger. First flight with five crewmembers.
Aug. 30	Space Shuttle Challenger (STS 8) Piloted by Astronauts Richard H. Truly Daniel C. Brandenstein Mission Specialists: Dale A. Gardner Guion S. Bluford Dr. William Thornton	6:01:09	Eighth flight of Space Transportation System, fourth operational flight, Launched Insat 1B satellite from cargo bay. First night launch and landing.
Nov. 28	Space Shuttle Columbia (STS 9) Piloted by Astronauts John W. Young Brewster W. Shaw Mission Specialists: Owen K. Garriott Robert A. R. Parker Payload Specialists: Byron K. Lichtenberg Ulf Merbold	10:07:47	Ninth flight of Space Transportation System, fifth operational flight. First flight of Spacelab 1, first flight with six crewmembers, first flight with payload specialists. West German Merbold was first non-U.S. astronaut to fly in U.S. space program.

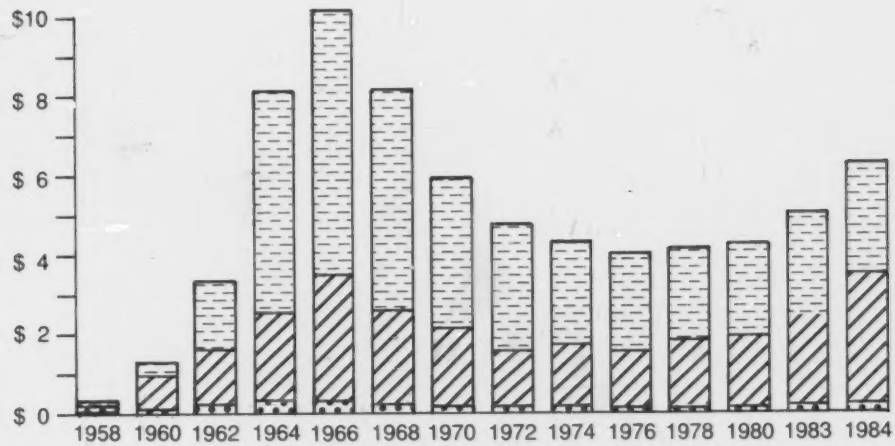
Source: NASA, Historian's Office.

FEDERAL OUTLAYS FOR SPACE ACTIVITIES

(Billions of Current Dollars)



(Billions of Constant Dollars—1972 = 100)



Source: Aerospace Industries Association

FEDERAL SPACE ACTIVITIES OUTLAYS

Fiscal Years 1955-1984[a]
(Millions of Current Dollars)

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1955	$ 75.3	$ 73.8	$ 1.5	$ —	$ —	$ —
1956	100.1	71.1	16.5	6.3	—	6.2
1957	150.1	76.1	47.5	19.2	—	7.3
1958	248.9	89.2	135.5	20.2	—	4.0
1959	433.9	58.8	341.0	32.6	—	1.5
1960	888.4	329.2	518.1	41.1	—	—
1961	1,467.9	693.6	710.0	64.3	—	—
1962	2,386.6	1,225.9	1,028.8	130.0	1.0	0.9
1963	4,078.6	2,516.8	1,367.5	181.0	12.2	1.1
1964	5,929.8	4,131.3	1,563.5	220.1	12.3	2.6
1965	6,886.1	5,035.0	1,591.8	232.2	24.1	3.0
1966	7,718.5	5,857.9	1,637.4	188.3	28.1	6.8
1967	7,237.3	5,336.7	1,673.1	183.6	38.6	5.3
1968	6,666.7	4,595.3	1,890.2	146.5	29.0	5.7
1969	6,326.1	4,078.0	2,095.0	117.5	31.0	4.6
1970	5,453.2	3,565.2	1,756.1	102.6	24.0	5.3
1971	4,999.0	3,171.0	1,693.0	97.3	29.8	7.9
1972	4,771.8	3,194.9	1,470.0	59.6	37.4	9.9
1973	4,719.4	3,069.4	1,557.0	51.1	29.4	12.5
1974	4,853.9	2,960.4	1,777.0	38.8	64.0	13.7
1975	4,890.8	2,950.9	1,831.1	34.3	63.6	10.9
1976	5,313.9	3,336.3	1,864.4	25.7	71.1	16.4
Tr. Qtr.	1,361.0	868.6	458.1	7.5	23.2	3.6
1977	5,559.1	3,599.5	1,832.7	22.2	86.9	17.8
1978	6,188.2	3,582.4	2,457.0	28.6	100.7	19.5
1979	6,808.3	3,743.9	2,891.8	54.7	97.4	20.5
1980	7,667.7	4,340.1	3,162.3	48.8	88.7	27.8
1981	9,165.5	4,877.1	4,130.5	46.9	81.0	30.0
1982	10,466.2	5,453.3	4,771.5	59.5	142.4	29.5
1983[E]	12,720.6	6,146.5	6,290.7	65.8	185.2	32.4
1984[E]	14,192.1	6,385.2	7,504.5	57.9	208.4	36.1

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.
a FY 1985 and revised FY 1984 estimates not available at time of publication.
b Excludes amounts for air transportation.
c Departments of Interior and Agriculture, and The National Science Foundation.
E Estimate.

FEDERAL SPACE ACTIVITIES OUTLAYS IN CONSTANT DOLLARS

Fiscal Years 1955-1984[a]
(Millions of Constant Dollars, 1972 = 100[b])

Year	TOTAL	NASA[c]	DOD	Energy	Commerce	Other[d]
1955	$ 122.9	$ 120.5	$ 2.4	$ —	$ —	$ —
1956	159.1	113.0	26.2	10.0	—	9.9
1957	230.0	116.6	72.8	29.4	—	11.2
1958	372.4	133.5	202.8	30.2	—	6.0
1959	636.6	86.3	500.3	47.8	—	2.2
1960	1,277.0	473.2	744.7	59.1	—	—
1961	2,086.3	985.8	1,009.1	91.4	—	—
1962	3,343.5	1,717.4	1,441.3	182.1	1.4	1.3
1963	5,620.2	3,468.1	1,884.4	249.4	16.8	1.5
1964	8,052.4	5,610.1	2,123.2	298.9	16.7	3.5
1965	9,182.7	6,714.2	2,122.7	309.6	32.1	4.0
1966	10,026.6	7,609.6	2,127.0	244.6	36.5	8.8
1967	9,110.4	6,717.9	2,106.1	231.1	48.6	6.7
1968	8,099.5	5,582.9	2,296.4	178.0	35.2	6.9
1969	7,340.6	4,732.0	2,431.0	136.3	36.0	5.3
1970	5,989.2	3,915.7	1,928.7	112.7	26.4	5.8
1971	5,228.0	3,316.3	1,770.6	101.8	31.2	8.3
1972	4,771.8	3,194.9	1,470.0	59.6	37.4	9.9
1973	4,518.3	2,938.6	1,490.7	48.9	28.1	12.0
1974	4,331.5	2,641.8	1,585.8	34.6	57.1	12.2
1975	3,967.6	2,393.9	1,485.4	27.8	51.6	8.8
1976	4,029.0	2,529.6	1,413.6	19.5	53.9	12.4
Tr. Qtr.	1,004.1	640.8	338.0	5.5	17.1	2.7
1977	3,949.1	2,557.1	1,301.9	15.8	61.7	12.6
1978	4,116.4	2,383.0	1,634.4	19.0	67.0	13.0
1979	4,165.1	2,290.4	1,769.1	33.5	59.6	12.5
1980	4,316.7	2,443.3	1,780.3	27.5	49.9	15.7
1981	4,700.5	2,501.2	2,118.3	24.1	41.5	15.4
1982	5,012.8	2,616.6	2,285.3	28.5	68.2	14.1
1983[E]	5,842.4	2,823.0	2,889.2	30.2	85.1	14.9
1984[E]	6,257.3	2,815.2	3,308.7	25.5	91.9	15.9

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.
a FY 1985 and revised FY 1984 estimates not available at time of publication.
b Based on fiscal year GNP implicit price deflator.
c Excludes amounts for air transportation.
d Departments of Interior and Agriculture, and The National Science Foundation.
E Estimate.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY

Fiscal Years 1955-1984[a]
(Millions of Current Dollars)

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1955	$ 60	$ 57	$ 3	$ —	$ —	$ —
1956	117	73	30	7	—	7
1957	179	78	71	21	—	8
1958	348	117	206	21	—	3
1959	785	261	490	34	—	—
1960	1,066	462	561	43	—	(*d*)
1961	1,808	926	814	68	—	1
1962	3,295	1,797	1,298	148	51	1
1963	5,435	3,626	1,550	214	43	2
1964	6,831	5,016	1,599	210	3	3
1965	6,956	5,138	1,574	229	12	3
1966	6,970	5,065	1,689	187	27	3
1967	6,710	4,830	1,664	184	29	3
1968	6,529	4,430	1,922	145	28	4
1969	5,976	3,822	2,013	118	20	3
1970	5,341	3,547	1,678	103	8	4
1971	4,741	3,101	1,512	95	27	5
1972	4,575	3,071	1,407	55	31	10
1973	4,825	3,093	1,623	54	40	15
1974	4,640	2,759	1,766	42	60	14
1975	4,914	2,915	1,892	30	64	13
1976	5,320	3,225	1,983	23	72	16
Tr. Qtr.	1,341	849	460	5	22	4
1977	5,983	3,440	2,412	22	91	18
1978	6,518[r]	3,623	2,738[r]	34	103	20
1979	7,244[r]	4,030	3,036[r]	59	98	21
1980	8,689	4,680	3,848	40	93	28
1981	9,978	4,992	4,828	41	87	30
1982	12,440	5,528	6,679	61	144	29
1983[E]	15,048	6,278	8,491	62	186	32
1984[E]	16,694	6,509	9,882	60	206	36

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
Note: Detail may not add to totals because of rounding.
a FY 1985 and revised FY 1984 estimates not available at time of publication.
b Excludes amounts for aeronautical-related activities.
c Departments of Interior and Agriculture, and the National Science Foundation.
d Less than $500,000.
E Estimate.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY IN CONSTANT DOLLARS[r]

Fiscal Years 1955-1984[a]
(Millions of Constant Dollars, 1972 = 100[b])

Year	TOTAL	NASA[c]	DOD	Energy	Commerce	Other[d]
1955	$ 98	$ 93	$ 5	$ —	$ —	$ —
1956	186	116	48	11	—	11
1957	274	120	109	32	—	12
1958	521	175	308	31	—	5
1959	1,152	383	719	50	—	—
1960	1,532	664	806	62	—	(e)
1961	2,570	1,316	1,157	97	—	1
1962	4,616	2,518	1,818	207	71	1
1963	7,489	4,997	2,136	295	59	3
1964	9,276	6,812	2,171	285	4	4
1965	9,276	6,852	2,099	305	16	4
1966	9,054	6,580	2,194	243	35	4
1967	8,447	6,080	2,095	232	37	4
1968	7,932	5,382	2,335	176	34	5
1969	6,934	4,435	2,336	137	23	3
1970	5,866	3,896	1,843	113	9	4
1971	4,958	3,243	1,581	99	28	5
1972	4,575	3,071	1,407	55	31	10
1973	4,619	2,961	1,554	52	38	14
1974	4,141	2,462	1,576	37	54	12
1975	3,986	2,365	1,535	24	52	11
1976	4,034	2,445	1,504	17	55	12
Tr. Qtr.	989	626	339	4	16	3
1977	4,250	2,444	1,713	16	65	13
1978	4,336[r]	2,410	1,821[r]	23	69	13
1979	4,432[r]	2,465	1,857[r]	36	60	13
1980	4,892	2,635	2,166	23	52	16
1981	5,117	2,560	2,476	21	45	15
1982	5,958	2,648	3,199	29	69	14
1983[E]	6,911	2,883	3,900	28	85	15
1984[E]	7,360	2,870	4,357	26	91	16

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President," (Annually).
a FY 1985 and revised FY 1984 estimates not available at time of publication.
b Based on fiscal year GNP implicit price deflator.
c Excludes amounts for aeronautic-related activities.
d Departments of Interior and Agriculture, and The National Science Foundation.
e Less than $500,000.
E Estimate.
r Revised from constant dollar data previously reported by AIA because of revision of GNP deflator series.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BUDGET AUTHORITY

Fiscal Years 1960-1985
(Millions of Current Dollars)

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 614	$ 333	$190	$ 91
1961	964	672	125	167
1962	1,825	1,285	326	214
1963	3,673	2,929	744	*(a)*
1964	5,099	3,890	713	496
1965	5,250	4,360	267	623
1966	5,175	4,502	61	612
1967	4,968	4,235	85	648
1968	4,589	3,912	38	639
1969	3,995	3,314	33	648
1970	3,749	2,993	53	703
1971	3,312	2,556	26	730
1972	3,308	2,523	53	732
1973	3,408	2,599	79	730
1974	3,040	2,194	101	745
1975	3,231	2,323	143	765
1976	3,552	2,678	82	792
Tr. Qtr.	932	700	11	221
1977	3,819	2,856	118	845
1978	4,064	3,012	162	890
1979	4,559	3,477	148	934
1980	5,243	4,088	159	996
1981	5,522	4,334	117	1,071
1982	6,020	4,772	114	1,134
1983	6,875	5,539	139	1,197

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984[E]	$7,218	$2,028	$3,775	$156	$1,259
1985[E]	7,491	2,400	3,600	160	1,331

Source: "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Included in Research and Development for one year.
E Estimate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY IN CONSTANT DOLLARS

Fiscal Years 1960-1985
(Millions of Constant Dollars 1972 = 100[a])

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 883	$ 479	$ 273	$131
1961	1,370	955	178	237
1962	2,557	1,800	457	300
1963	5,061	4,036	1,025	*(b)*
1964	6,924	5,282	968	674
1965	7,001	5,814	356	831
1966	6,723	5,848	79	795
1967	6,254	5,331	107	816
1968	5,575	4,753	46	776
1969	4,636	3,845	38	752
1970	4,118	3,287	58	772
1971	3,464	2,673	27	763
1972	3,308	2,523	53	732
1973	3,263	2,488	76	699
1974	2,713	1,958	90	665
1975	2,621	1,884	116	621
1976	2,693	2,030	62	601
Tr. Qtr.	688	516	8	163
1977	2,713	2,029	84	600
1978	2,703	2,004	108	592
1979	2,789	2,127	91	571
1980	2,947	2,301	90	561
1981	2,832	2,223	60	549
1982	2,883	2,286	55	543
1983	3,158	2,544	64	550

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984[E]	$3,182	$ 894	$1,664	$69	$555
1985[E]	3,150	1,009	1,514	67	560

Source: AIAA derived from "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding
a Based on fiscal year GNP implicit price deflator.
a Included in Research and Development for one year.
E Estimate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS

Fiscal Years 1960-1985
(Millions of Current Dollars)

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 401	$ 256	$ 54	$ 91
1961	744	487	98	159
1962	1,257	936	114	207
1963	2,552	1,912	225	416
1964	4,171	3,317	438	416
1965	5,093	3,984	531	578
1966	5,933	4,741	573	619
1967	5,426	4,487	289	650
1968	4,724	3,746	126	652
1969	4,251	3,530	65	656
1970	3,753	2,992	54	707
1971	3,382	2,630	44	708
1972	3,422	2,623	50	749
1973	3,315	2,541	45	729
1974	3,256	2,421	75	760
1975	3,266	2,420	85	761
1976	3,669	2,749	121	799
Tr. Qtr.	952	731	26	195
1977	3,945	2,980	105	860
1978	3,983	2,989	124	870
1979	4,196	3,139	133	925
1980	4,852	3,702	140	1,010
1981	5,426	4,228	147	1,050
1982	6,035	4,796	109	1,130
1983	6,664	5,316	108	1,240

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984[E]	$7,068	$2,604	$3,071	$139	$1,256
1985[E]	7,370	2,375	3,501	163	1,331

Source: "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
E Estimate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS IN CONSTANT DOLLARS

Fiscal Years 1960-1985
(Millions of Constant Dollars, 1972 = 100[a])

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 576	$ 368	$ 78	$131
1961	1,057	692	139	226
1962	1,761	1,311	160	290
1963	3,517	2,635	310	573
1964	5,664	4,504	595	565
1965	6,792	5,313	708	771
1966	7,707	6,159	744	804
1967	6,830	5,648	364	818
1968	5,739	4,794	153	792
1969	4,933	4,097	75	761
1970	4,122	3,286	59	776
1971	3,537	2,750	46	740
1972	3,422	2,623	50	749
1973	3,174	2,433	43	698
1974	2,906	2,160	67	678
1975	2,649	1,963	69	617
1976	2,782	2,084	92	606
Tr. Qtr.	702	539	19	144
1977	2,802	2,117	75	611
1978	2,650	1,988	82	579
1979	2,567	1,920	81	566
1980	2,732	2,084	79	569
1981	2,783	2,168	75	538
1982	2,890	2,297	52	541
1983	3,061	2,442	50	570

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984[E]	$3,116	$1,148	$1,354	$61	$554
1985[E]	3,099	999	1,472	69	560

Source: AIA, derived from "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Based on fiscal year GNP implicit price deflator.
E Estimate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY FOR RESEARCH AND DEVELOPMENT AND SPACE FLIGHT, CONTROL & DATA COMMUNICATIONS

Fiscal Years 1983-1985
(Millions of Dollars)

	1983[a]	1984[E]	1985[E]
RESEARCH AND DEVELOPMENT—TOTAL	$1,903	$2,028	$2,400
Space Station—Total	—	—	150
Space Transportation Capability Development—Total	416	432	361
Space Science & Applications—Total	1,060	1,134	1,372
Physics and Astronomy	470	568	677
Planetary Exploration	186	217	287
Life Sciences	56	58	63
Space Applications	348	291	344
Technology Utilization—Total	9	9	10
Aeronautics & Space Technology—Total	405	439	492
Aeronautical Research & Technology	280	302	342
Space Research & Technology	125	137	150
Tracking and Data Acquisition—Total	13	14	15
SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS—TOTAL	$3,633	$3,775	$3,600
Space Shuttle Production & Operational Capability—Total	1,726	1,649	1,466
Orbiter	904	716	607
Launch & Mission Support	246	278	235
Propulsion Systems	576	618	599
Changes & System Upgrading	—	37	25
Space Transportation Operations—Total	1,422	1,452	1,339
Shuttle Operations	1,339	1,402	1,339
Expendable Launch Vehicles	83	50	—
Space Tracking & Data Acquisition—Total	486	674	796

Source: "NASA Budget Briefing Background Material" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Shown on a comparative basis with the FY1984-85 budget structure, which introduces the new category of "Space Flight, Control and Data Communications Programs."

DEPARTMENT OF DEFENSE
SPACE AND SPACE-RELATED PROGRAMS[a]

Fiscal Years 1976-1985
(Millions of Dollars)

Program	1981	1982	1983	1984[E]	1985[E]
TOTAL	$4,797.1[b]	$6,362.3	$8,510.0	$10,590.3	$12,912.7
Mission-Oriented—TOTAL	1,218.2	1,910.9	2,670.0	2,812.9	3,236.1
Navigation	166.9	224.5	290.0	460.0	576.6
Communications	687.6	979.7	1,340.0	1,406.0	1,721.0
Warning	265.6	563.2	710.0	756.9	561.1
Mapping/Charting/Geodesy	11.6	29.2	100.0	79.9	77.7
Weather	86.5	114.3	230.0	110.1	299.7
Vehicle Development	758.5	863.8	1,070.0	1,214.2	1,534.9
Space Ground Support[c]	315.2	433.4	600.0	806.9	1,054.4
Supporting R&D[d]	586.1	755.2	900.0	1,098.7	1,288.5
General Support[e]	1,919.1	2,399.0	3,270.0	4,657.6	5,798.8
Program (Continued)	**1976**	**1977**	**1978**	**1979**	**1980**
TOTAL	$1,983.3	$2,411.9	$2,728.8	$ 3,211.3	$ 3,848.4
Mission-Oriented--TOTAL	609.7	989.3	904.0	860.3	977.3
Navigation	104.8	104.9	93.8	117.7	185.6
Communications	361.4	720.9	574.2	458.6	506.2
Warning	88.7	87.9	150.0	214.3	207.3
Mapping/Charting/Geodesy	8.5	7.7	7.3	8.5	10.3
Weather	46.3	67.9	78.7	61.2	67.9
Vehicle Development	54.7	108.3	289.6	509.6	661.0
Space Ground Support[c]	111.7	123.6	173.7	210.9	242.3
Supporting R&D[d]	159.3	209.5	296.0	434.0	427.7
General Support[e]	1,047.9	981.2	1,065.5	1,196.5	1,540.1

Source: Department of Defense, statement to Subcommittee on Science, Technology and Space of the Senate Committee on Commerce, Science and Transportation (Annually).

a Total obligational authority.
b Total subsequently revised to $4,828 million; program detail not available.
c Includes range support, instrumentation, ground based satellite detection, tracking, and control.
d Includes research, exploratory and advanced development.
e Includes support organizations as well as general operational support.
E Estimate.

DEPARTMENT OF DEFENSE SPACE PROGRAMS[a] PROCUREMENT (INCLUDING INITIAL SPARES) AND RDT&E

Fiscal Years 1983, 1984 and 1985
(Millions of Dollars)

Agency and Program	1983		1984[E]		1985[E]	
	Procurement	RDT&E	Procurement	RDT&E	Procurement	RDT&E
AIR FORCE						
Air Force Satellite Communications System (Afsatcom)	$ 28.4	$ 43.1	$ 30.4	$177.6	$ —	$141.6
Defense Meteorological Satellite Program (DMSP)	166.8	23.1	33.6	25.3	139.9	42.6
Defense Satellite Communications System (DSCS)	180.3	41.9	115.7	39.8	291.2	31.6
Navstar Global Positioning System	111.5	122.6	237.1	126.7	332.3	103.5
Space Defense System	—	213.3	19.3	203.6	83.0	143.3
Space Launch Support	128.2	16.4	137.5	34.2	208.0	93.8
Space Shuttle	135.0	356.3	193.0	334.0	137.9	345.0
Space Boosters	61.7	15.0	—	15.4	25.3	20.4
NAVY						
Fleet Satellite Communications (Fltsatcom)	$230.3	$ 3.9	$101.5	$ 7.5	$ 51.4	$ 11.6

Source: "Program Acquisition Costs by Weapon System," "Procurement Program (P-1)," and "R,D,T&E Programs (R-1)," Department of Defense Budget (Annually).
a Total Obligational Authority.
E Estimate.

ORDERS, SALES, AND BACKLOG SPACE VEHICLE SYSTEMS[a]

(Excluding Engines and Propulsion Units)
Calendar Years 1968-1983
(Millions of Dollars)

Year	SALES-Current Dollars			SALES-Constant Dollars[b]		
	TOTAL	Military[a]	Non-Military	TOTAL	Military[a]	Non-Military
1968	$2,357	$ 899	$1,458	$2,776	$1,059	$1,717
1969	2,282	1,187	1,095	2,584	1,344	1,240
1970	1,956	1,025	931	2,096	1,099	998
1971	1,725	860	865	1,778	887	892
1972	1,656	905	751	1,656	905	751
1973	1,562	902	660	1,502	867	635
1974	1,751	944	807	1,509	814	696
1975	2,119	1,096	1,023	1,610	833	777
1976	2,002	904	1,098	1,386	626	760
1977	1,870	814	1,056	1,205	524	680
1978	2,324	1,006	1,318	1,382	598	784
1979	2,539	1,105	1,434	1,362	593	769
1980	3,483	1,461	2,022	1,660	696	964
1981	3,856	1,736	2,120	1,630	734	896
1982[r]	4,749	2,606	2,143	1,853	1,017	836
1983	5,221	2,575	2,646	1,920	947	973

Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military[a]	Non-Military	TOTAL	Military[a]	Non-Military
1968	$2,659	$1,169	$1,490	$1,329	$ 834	$ 495
1969	2,231	1,173	1,058	1,330	869	461
1970	1,811	973	838	1,184	786	398
1971	1,457	677	780	916	603	313
1972	1,699	948	751	959	646	313
1973	1,780	1,179	601	1,177	923	254
1974	2,066	1,152	914	1,492	1,131	361
1975	1,931	984	947	1,304	1,019	285
1976	1,932	787	1,145	1,234	902	332
1977	2,225	1,175	1,050	1,589	1,263	326
1978	3,157	1,436	1,721[c]	2,188	1,693	495
1979	2,698	1,018	1,680	1,448	909	539
1980	3,636	1,625	2,011	2,099	1,218	881
1981	5,062	2,878	2,184	3,163[r]	2,166[r]	997[r]
1982	5,925	2,844	3,081	4,337[r]	2,403[r]	1,934[r]
1983	6,391	3,673	2,718	5,508	3,502	2,006

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).
a Space vehicle systems and parts sold to other than U.S. Government customers included as of 1980; previously, this product group combined with missile systems and parts.
b Based on aerospace composite price deflator (1972 = 100).
c AIA estimate based on MQ37D data.
r Revised.

air transportation

Record levels of passenger and cargo traffic, coupled with improved yields, enabled the U.S. airline industry to record its first operating profit in four years, but heavy interest burdens and other factors kept net income in the red. Nonetheless, the year was viewed as an encouraging turnaround. On the basis of results for the early months of 1984, the Air Transport Association predicted a solid operating profit for 1984—perhaps as much as $1.5 billion—but added that net profits will be far below that figure.

According to data compiled by the Civil Aeronautics Board, U.S. air carriers had a 1983 operating profit of $425 million on operating revenues of $38.2 billion. These figures compare with a 1982 record loss of $739 million on revenues of $36.1 billion. The 1983 profit was due to a strong performance in international operations, where the airlines achieved an operating profit of $493 million, compared with a loss of $17 million in the previous year. In domestic operations, the industry sustained an operating loss of $131 million, which compares with a $750 million loss in 1982.

Traffic on U.S. scheduled air service increased sharply in 1983. In domestic operations, carriers boarded 296 million passengers and flew them 226 billion passenger miles. Both figures are all-time highs; they compare with 274 million passengers flown 210 billion passenger miles in 1982. The revenue passenger load factor for 1983 was 59.9 percent, up from 58.5 percent. Domestic flights accounted for 93 percent of all passengers boarded by U.S. airlines in 1983, same as a year earlier. U.S. carriers also flew 7.6 billion revenue ton miles of cargo, a record; the figure for the previous year was 6.9 billion.

International traffic increased after three years of decline. Passengers enplaned by U.S. airlines on international routes totaled 21.9 million, up from 19.8 million in 1982. Revenue passenger miles amounted to 54.8 billion, up from 49.5 billion in 1982. The passenger load factor in international service was 64.3 percent, compared with 61.4 percent in 1982.

U.S. air carriers, including operators other than scheduled airlines, were flying 4,203 multi-engine aircraft at the end of 1983; the figure represent an increase of 131 planes over 1982. Turbojet aircraft numbered 2,767, about 66 percent of the total; the fleet also included 876 turboprops, 551 piston-engine aircraft and nine helicopters.

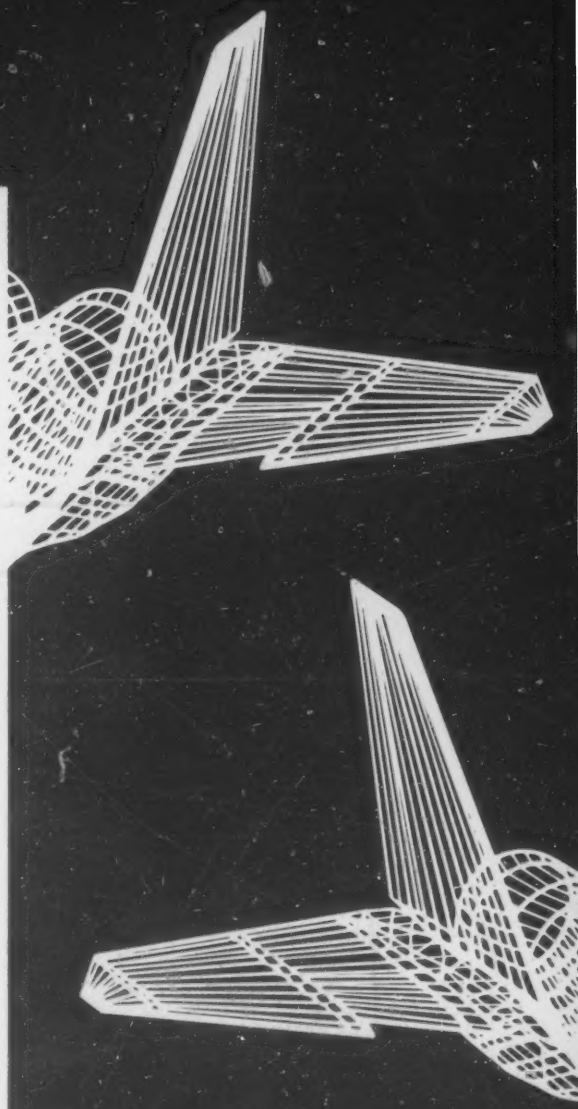
Worldwide commercial air traffic also recorded substantial gains in 1983. Airlines of the 152 member states of the International Civil Aviation Organization boarded 782 million passengers, which compares with 758 million in 1982, and flew them 730 billion passenger miles, 24 billion more than in 1982. The passenger load factor was 65 percent, up from 64 percent. ICAO airlines also carried 13.1 million tons of freight and accomplished 23.5 billion freight ton miles; the comparable figures for the previous year were 12.5 million tons, 21.4 billion ton miles.

The world fleet of turbine-engine aircraft in airline service increased by 423 airplanes, according to the annual survey conducted by Exxon International. The gain was due in part to an increase in the number of

airlines listed in the survey, which grew from 615 to 687. As of March 31, 1983, the world fleet—excluding planes operated by the Soviet Union, totaled 9,643 aircraft, the highest number ever reported by the survey; it compares with 9,220 in the previous year. Of the total, 6,462—67 percent—were turbojets, 187 more than in 1982; 2,956 were turboprops (up 259) and there were 225 turbine-powered helicopters (down 23).

Of the 9,643 aircraft in the world airline fleet, 6,440—66.8 percent—were of U.S. manufacture; the percentage compares with 67.5 percent in the previous survey. Of the 6,462 turbojet-powered transports, 5,458—84.5 percent—were built in the U.S.; the latter figure compares with 84.9 percent in 1982. Only 795 of the 2,956 turboprops listed—26.9 percent—were of U.S. manufacture; the comparable figures for 1982 were 685 and 25.4 percent. Of the 225 turbine-powered helicopters in service, 187—83.1 percent—were produced in the U.S.; this represented a drop from 87.9 percent in the previous year.

At the end of 1983, the U.S. air transportation system included 16,029 civil and joint civil/military-use airfield facilities in the U.S., Puerto Rico, the U.S. Virgin Islands and the Pacific territories. A breakdown shows 12,653 airports, 5,628 of them for public use and 7,025 for private use; 2,918 heliports (124 public, 2,794 private); 66 stolports (10 public, 56 private); and 392 seaplane bases (225 public, 167 private). Texas led the list with 1,543 facilities of all types, followed by Illinois (909), California (862), Pennsylvania (720), Ohio (678) and Alaska (615). The total number of facilities was 198 higher than in the previous year.



OPERATING REVENUES AND EXPENSES OF WORLD SCHEDULED AIRLINES[a]

Calendar Years 1978-1983
(Millions of U.S. Dollars)

	1978	1979	1980	1981	1982	1983
OPERATING REVENUES:						
Scheduled Services:						
Passenger	$46,625	$56,483	$69,930	$74,433	$74,860	
Freight	6,463	7,709	9,468	9,523	9,560	
Mail	974	1,141	1,501	1,425	1,480	NA
Total Schedule Services	$54,062	$65,333	$80,899	$85,381	$85,900	
Non-Scheduled Services	2,076	2,418	3,149	3,682	3,100	
Incidental	2,630	3,003	3,628	3,929	4,240	
Total Operating Revenues	$58,769	$70,755	$87,676	$92,992	$93,240	$97,000
OPERATING EXPENSES:						
Flight Operations	$16,700	$24,045	$34,345	$36,676	$34,600	
Maintenance & Overhaul	6,854	8,013	9,283	9,640	9,150	
Depreciation & Amortization	4,380	4,699	5,449	5,968	6,330	
User Charges & Station Expenses	9,920	11,895	13,713	13,828	14,540	NA
Passenger Services	5,618	6,718	7,967	8,085	8,540	
Ticketing, Sales & Promotion	8,601	10,390	12,484	13,800	14,510	
General, Administrative & Other	3,595	4,258	5,069	5,687	5,730	
Total Operating Expenses	$55,669	$70,019	$88,310	$93,684	$93,400	$95,000
OPERATING RESULT	$ 3,100	$ 736	$ (635)	$ (692)	$ (160)	$ 2,000
Percent of Revenue	5.3%	1.0%	(0.7%)	(0.7%)	(0.2%)	2.1%
NET RESULT[b]	$ 2,412	$ 588	$ (919)	$(1,150)	$(1,300)	NA
Percent of Revenue	4.1%	0.8%	(1.0%)	(1.2%)	(1.4%)	NA

Source: International Civil Aviation Organization.
NOTE: Data in parentheses represent negative values.
a Excludes People's Republic of China and USSR domestic.
b Net Result equals Operating Result minus non-operating items, including interest, income taxes, retirement of property and equipment, affiliated companies and subsidies.
NA Not available.

TRAFFIC STATISTICS
WORLD AIRLINE SCHEDULED SERVICE[a]

Calendar Years 1970-1983

Year	Passengers Carried	Freight Tons Carried	Passenger-Miles Performed	Seat-Miles Available	Passenger Load Factor	Ton-Miles Performed		
						Freight	Mail	TOTAL (Passengers & Baggage, Freight, Mail)
	(Millions)		(Billions)		(Percent)	(Millions)		
1970	383[r]	6.7	286	522	55%	8,230[r]	2,110[r]	38,820
1971	411	7.4	307	568	54	9,060	1,990	41,420
1972	450	8.0	348	610	57	10,290	1,900	46,690
1973	489	9.0	384	667	58	12,010	1,970	51,900
1974	515	9.6	407	688	59	13,030	1,970	55,270
1975	534	9.6	433	733	59	13,270	1,990	58,070
1976	576	10.3	475	789	60	14,750	2,080	63,880
1977	610	11.4	508	836	61	16,180	2,180	68,790
1978	679	11.7	582	902	65	17,770	2,240	77,770
1979	754	12.1	659	999	66	19,180	2,350	86,900
1980	748	12.1	677	1,069	63	19,950	2,520	89,530
1981	749	11.9	694	1,089	64	20,970	2,600	92,490
1982[r]	758	12.5	706	1,109	64	21,400	2,660	94,290
1983[E]	782	13.1	730	1,131	65	23,500	2,740	98,810

Source: International Civil Aviation Organization (ICAO).

a Includes international and domestic traffic on scheduled service performed by the airlines of the 152 States which were members of ICAO in 1983.

r Revised.

E Estimate.

INTERNATIONAL OPERATING FLEET[a] AND ESTIMATED AVERAGE AGE BY TYPE OF AIRCRAFT

As of December 31, 1983

Number of Engines and Aircraft Model	Number of Aircraft	Average Age (Years)
TOTAL 4-ENGINED	888	12.3
Jet Aircraft	831	11.8
Boeing 707	177	16.2
Boeing 720	31	21.6
Boeing 747	431	8.3
Concorde	11	6.6
Douglas DC-8 60/70 Series	120	15.3
Douglas DC-8	35	18.3
Ilyushin IL-62	25	6.6
Others	1	1.0
Propeller Aircraft	57	19.0
Ilyushin IL-18	16	18.4
Lockheed Electra	17	24.4
Vickers Viscount	10	27.6
Others	14	8.4
TOTAL 3-ENGINED	1,439	10.0
Jet Aircraft	1,439	10.0
Boeing 727	982	10.9
Douglas DC-10	251	8.2
Hawker Siddeley Trident	26	13.2
Lockheed L-1011	146	7.2
Yakovlev Yak-40	30	7.2
Others	4	2.3
TOTAL 2-ENGINED	1,765	9.4
Jet Aircraft	1,299	8.2
Aerospatiale Caravelle	5	18.0
Airbus A-300B	167	3.5
Boeing 737	442	7.7
Boeing 757	23	1.1
Boeing 767	52	1.3
BAC 1-11	66	13.3
Douglas DC-9	457	11.0
Fokker F-28	62	6.1
Tupolev TU-134	22	8.8
Others	3	4.6
Propeller Aircraft	466	12.7
Antonov AN 24/26	28	14.3
Douglas DC-3/C-47	18	40.0
Fokker F-27/Fairchild F-27/F-227	134	13.8
HS 748	46	12.6
Ilyushin IL-14	1	17.0
NAMC YS11	18	15.7
Others	221	9.4
TOTAL 1-ENGINED	27	12.2
TOTAL HELICOPTERS	8	6.0
GRAND TOTAL	4,127[a]	10.2

Source: International Air Transport Association (IATA), "World Air Transport Statistics" (Annually).

a Aircraft in service of IATA's 125 member airlines. These fleet data represent fewer airlines than covered by the International Civil Aviation Organization (ICAO), and are reported here to present fleet age information.

INTERNATIONAL OPERATING FLEET[a] BY REGION
NUMBER OF AIRLINES, NUMBER OF AIRCRAFT, AND AVERAGE AGE

As of December 31, 1983

Region[b] of Airline Registration	Number of Airlines	Number of Aircraft[a]		Estimated Average Age (Years)	
		Jet	Non-Jet	Jet	Non-Jet
TOTAL	125	3,569	558	9.7	13.3
North America	12	1,359	26	10.9	18.3
Latin America & Caribbean	19	345	53	9.8	15.2
Europe	25	1,007	111	9.2	14.2
Middle East	11	214	12	8.7	5.8
Asia & Pacific	25	370	215	7.5	11.3
Africa	33	274	141	9.6	14.1

Source: International Air Transport Association (IATA), "World Air Transport Statistics" (Annually).

a Aircraft in service of IATA's 125 member airlines. These fleet data represent fewer airlines and aircraft than covered by the International Civil Aviation Organization (ICAO), and are reported here to present information on fleet age and distribution.

b ICAO's statistical regions.

WORLD AIRLINE FLEET
TURBINE-ENGINED AIRCRAFT

By Model
Years 1979-1983

	1979	1980	1981	1982	1983
TOTAL AIRCRAFT IN SERVICE	7,787	8,010	8,726	9,220	9,643
Number Manufactured in U.S.	5,341	5,590	5,900	6,199	6,440
Percent Manufactured in U.S.	68.6%	69.8%	67.6%	67.2%	66.8%
Turbojets—TOTAL	5,534	5,756	6,085	6,275	6,462
Aerospatiale SE-210 Caravelle	111	102	119	93	105
Aerospatiale SN-601 Corvette	19	13	11	11	10
Airbus A300	76	102	132	168	206
Airbus A310	—	—	—	—	4
B.Ae. 111	162	158	159	156	155
B.Ae. HS-125	5	6	6	9	9
B.Ae. VC-10	17	6	1	—	—
B.Ae./Aerospatiale Concorde	9	13	14	14	14
B.Ae. Comet	7	4	—	—	—
B.Ae. Trident	97	64	86	71	71
Boeing 707/720	638	569	547	512	435
Boeing 727	1,427	1,560	1,585	1,636	1,602
Boeing 737	555	593	708	779	879
Boeing 747	349	420	478	517	533
Boeing 757	—	—	—	—	10
Boeing 767	—	—	—	—	37
Cessna 500/550 Citation I/II	3	13	37	25	22
Convair 880/990	13	14	12	13	15
Dassault Falcon 10/20	36	33	45	40	46
Dassault Mercure	10	10	10	10	10
Fokker F-28 Fellowship	122	115	128	133	124
Gates Learjet	10	14	35	21	27
Gulfstream II/III G-1159	6	8	12	16	14
Ilyushin IL-62	39	41	39	47	47
Ilyushin IL-76	—	6	2	11	17
Israel Aircraft 1121/1124	—	—	5	10	12
Lockheed L-1329 JetStar	1	1	4	7	7
Lockheed L-1011 TriStar	160	177	192	215	224
MBB Hansa HFB-320	—	6	5	—	—
McDonnell Douglas DC8	396	382	358	301	336
McDonnell Douglas DC-9	836	856	882	941	971
McDonnell Douglas DC-10	276	307	338	342	346
Rockwell Sabreliner	1	2	—	—	—
Tupolev Tu-124	—	2	—	2	2
Tupolev Tu-134	68	82	68	89	86
Tupolev Tu-154	26	33	31	38	39
VFW-Fokker 614	12	2	5	—	—
Yakolev Yak-40/42	47	42	31	48	47
Turboprops—TOTAL	2,013	2,059	2,508	2,697	2,956
Aerospatiale N.262 Mohawk 298	33	30	29	22	30
Antonov An.12	2	10	3	8	8

(Continued on next page)

WORLD AIRLINE FLEET
TURBINE-ENGINED AIRCRAFT (Continued)
By Model
1979-1983

	1979	1980	1981	1982	1983
Turboprops (continued)					
Antonov An.24/26	90	125	96	149	159
Antonov An.30	—	—	1	—	—
B.Ae. HP-137 Jetstream	6	3	17	17	18
B.Ae. Vanguard	23	11	8	9	8
B.Ae. Viscount	91	84	77	78	67
B.Ae. HS-748	133	141	144	151	154
Beech 99	118	107	123	128	146
Beech 90 King Air	11	15	16	20	24
Beech 100 King Air	—	—	—	8	7
Beech 200 King Air	—	—	20	22	44
Beech 18-TP Conv.	6	5	—	—	1
Bristol 175 Britannia	9	10	12	10	8
Canadair CL-44	17	12	10	8	12
CASA/Nurtanio C-212 Aviocar	9	9	34	60	66
Cessna 400 Srs. TP Conv.	1	2	—	—	—
Cessna 425/441 Conquest I/II	—	—	2	6	13
Convair 580/600/640	121	132	147	156	156
DHC-2 Turbo Beaver	14	11	8	8	11
DHC-5 Buffalo	—	—	—	—	2
DHC-6 Twin Otter	327	321	456	449	464
DHC-7 Dash 7	8	18	38	59	78
Dornier DO 128 Turbo-Skyservant	—	—	—	1	1
Dornier DO-228	—	—	—	—	5
Embraer EMB-110 Bandeirante	61	60	157	189	220
Fokker/Fairchild F-27/FH-227 Friendship	364	363	402	377	405
GAF Nomad	10	9	34	42	34
Grumman G-159 Gulfstream I	—	8	16	15	20
Grumman G-73 Turbo Mallard	—	—	1	1	6
Grumman G-21C Turbo Goose	2	3	2	2	1
Handley Page Herald	36	34	31	34	34
Hawker-Siddeley Argosy	9	8	5	5	7
Ilyushin IL-18	82	79	61	72	74
Israel Aircraft Arava 101B	—	—	—	3	5
LET L-410	11	11	11	—	—
Lockheed L-188 Electra	86	89	96	88	85
Lockheed L-100/L-382 Hercules	44	41	48	49	51
Mitsubishi MU-2B	15	10	13	13	17
NAMC YS-11	121	112	117	114	113
Pilatus PC-6 Turbo Porter	12	7	5	8	9
Piper PA-31T/42 Cheyenne	1	1	6	8	10
Piper T-1040	—	—	—	—	1
Rockwell Turbo Commander	2	1	12	9	10
Saunders ST-27	2	11	5	9	9
Shorts SC-5 Belfast	—	—	—	3	5

(Continued on next page)

WORLD AIRLINE FLEET
TURBINE-ENGINED AIRCRAFT (Continued)

By Model
1979-1983

	1979	1980	1981	1982	1983
Turboprops (continued)					
Shorts SC-7 Skyliner/Skyvan	21	22	29	36	37
Shorts 330	26	36	63	72	88
Shorts 360	—	—	—	—	7
Swearingen Merlin	—	3	6	4	2
Swearingen Metro	81	108	143	169	218
Transall C-160	—	—	5	6	6
Other	8	—	—	—	—
Turbine-Powered Helicopters—TOTAL	240	195	133	248	225
Aerospatiale SA-315 Lama	—	—	2	3	7
Aerospatiale SA-316 Alouette III	—	—	—	—	3
Aerospatiale SA-318 Alouette II	21	7	7	2	1
Aerospatiale SA-319 Alouette III Astazou	—	—	—	—	1
Aerospatiale SA-321 Super Frelon	—	1	—	—	—
Aerospatiale SA-330 Puma	20	17	3	2	—
Aerospatiale AS-332 Super Puma	—	—	1	1	1
Aerospatiale SA-341 Gazelle	—	—	1	2	—
Aerospatiale AS-350 Ecureuil/ AStar	—	—	—	1	3
Aerospatiale AS-355 Ecureuil 2/ Twinstar	—	—	—	2	1
Aerospatiale SA-360 Dauphin	—	—	7	7	8
Aerospatiale SA-365 Dauphin II	—	—	—	—	1
Bell 204	9	5	4	13	10
Bell 205	4	1	—	6	6
Bell 206 Jetranger/Longranger	50	26	7	81	35
Bell 212	11	7	5	15	15
Bell 222	1	—	—	—	—
Bell 214	1	4	3	4	7
Boeing Vertol 234 Chinook	—	—	1	6	6
Hughes 500	63	72	24	24	30
M.B.B./Nurtanio Bo. 105	5	4	11	9	7
Mil Mi-8	—	3	—	—	—
Sikorsky S-55T	3	—	3	3	3
Sikorsky S-58T	10	8	9	13	15
Sikorsky S-61	38	35	34	42	44
Sikorsky S-62	—	—	1	—	—
Sikorsky S-64	—	—	1	—	—
Sikorsky S-76	4	5	9	11	16
Westland 30	—	—	—	1	5

Source: Exxon International Company, "Air World Survey," (Annually).
NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and covers aircraft in service as of March 31 for 1982 and 1983 data, and as of June 30 for prior years. Excludes air taxi operators. Effective 1979, excludes a number of companies operating smaller types of aircraft and not providing scheduled services. As of 1983, the survey included 687 airlines.

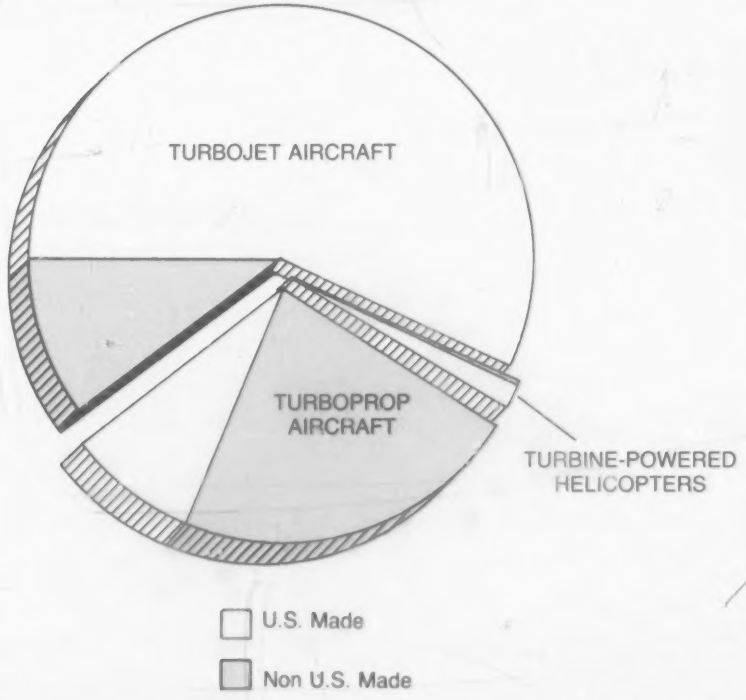
U.S. TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

Calendar Years 1979-1983

	1979	1980	1981	1982	1983
TOTAL AIRCRAFT IN SERVICE	7,787	8,010	8,726	9,220	9,643
Number Manufactured in U.S.	5,341	5,590	5,927r	6,228r	6,440
Percent Manufactured in U.S.	68.6%	69.8%	67.9%r	67.5%r	66.8%
Turbojet Aircraft in Service	5,534	5,756	6,085	6,275	6,462
Number Manufactured in U.S. ..	4,671	4,916	5,188	5,325	5,458
Percent Manufactured in U.S. ..	84.4%	85.4%	85.3%	84.9%	84.5%
Turboprop Aircraft in Service ...	2,013	2,059	2,508	2,697	2,956
Number Manufactured in U.S. ..	477	515	638	685	795
Percent Manufactured in U.S. ..	23.7%	25.0%	25.4%	25.4%	26.9%
Turbine-Powered Helicopters In Service	240	195	133	248	225
Number Manufactured in U.S. ..	193	159	101r	218r	187
Percent Manufactured in U.S. ..	80.4%	81.5%	75.9%r	87.9%r	83.1%

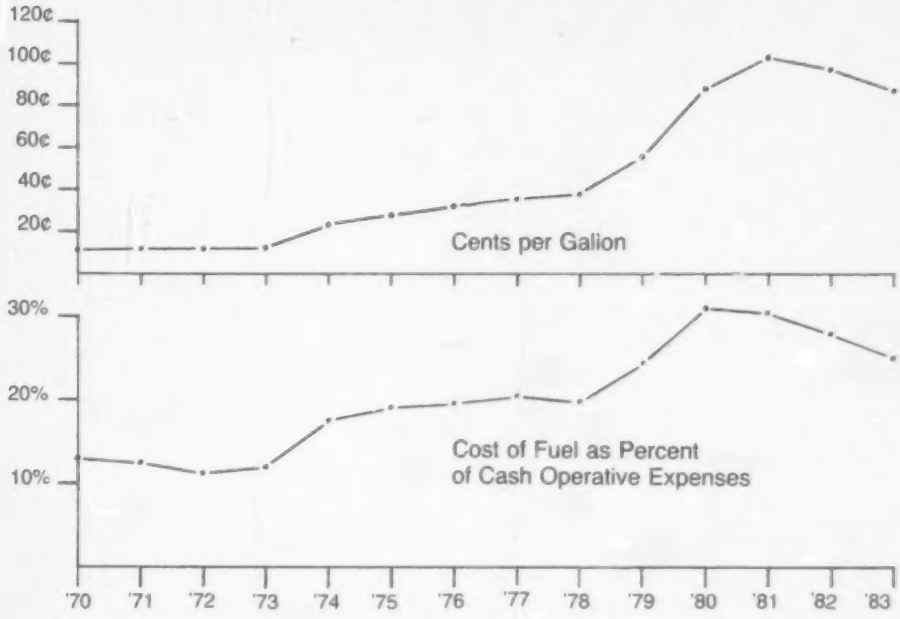
Source: Exxon International Company, "Air World Survey," (Annually).
NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and includes aircraft in service as of March 31 for 1982 and 1983 data, and as of June 30 for prior years. Excludes air taxi operators. Effective 1979, excludes a number of companies operating smaller types of aircraft and not providing scheduled service. As of 1983, the survey included 687 airlines.
r Revised.

U.S. MANUFACTURED TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET, 1983



Source: Aerospace Industries Association, based on data from Exxon International Company, "Air World Survey, 1983"

JET FUEL COSTS OF U.S. AIR CARRIERS



Source: Aerospace Industries Association, based on data from Air Transport Association of America.

JET FUEL COSTS AND CONSUMPTION BY U.S. AIR CARRIERS[a]

Calendar Years 1970-1983

Year	Gallons Consumed (Millions)	Total Cost (Millions)	Cost Per Gallon (Cents)	Cost Index (1972 = 100)	Cost of Fuel as Percent of Cash Operating Expenses
1970	9,201.7	$1,008.8	11.0¢	94.3	12.7%
1971	9,410.4	1,058.3	11.2	96.7	12.5
1972	9,531.8	1,108.4	11.6	100.0	11.9
1973	10,167.1	1,292.2	12.7	109.3	12.1
1974	9,088.6	2,221.9	24.4	210.2	17.4
1975	9,006.2	2,627.9	29.2	250.9	19.0
1976	9,353.7	2,960.7	31.7	272.2	19.3
1977	9,758.2	3,536.9	36.2	311.7	20.3
1978	10,034.2	3,943.3	39.3	337.9	19.9
1979	10,644.3	6,146.5	57.7	496.6	24.8
1980	10,348.7	9,307.6	89.9	773.4	30.3
1981	9,619.5	10,023.3	104.2	896.0	30.1
1982	9,390.6	9,242.9	98.4	846.4	27.8
1983	9,686.1	8,638.8	89.2	766.9	25.0

Source: Air Transport Association of America.

a Includes Majors and Nationals, per CAB classifications effective 1981, corresponding to previous categories of System Trunks and Local Service Carriers. Revised from previously reported data; Continental Airlines, Air Florida, and World Airways not included in 1983 data, and excluded from prior year data for comparability.

OPERATING REVENUES AND EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1960-1983
(Millions of Dollars)

Year	TOTAL OPERATIONS[b]			Domestic Operations			International Operations		
	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)
1960	$ 2,884	$ 2,807	$ 78	$ 2,178	$ 2,141	$ 37	$ 706	$ 666	$ 40
1961	3,064	3,043	20	2,305	2,307	(2)	759	737	22
1962	3,439	3,249	190	2,589	2,488	100	850	760	90
1963	3,759	3,479	280	2,790	2,646	144	969	833	136
1964	4,251	3,781	470	3,169	2,849	320	1,082	932	150
1965	4,958	4,286	672	3,691	3,239	452	1,267	1,047	220
1966	5,745	4,970	775	4,171	3,670	502	1,574	1,300	274
1967	6,865	6,157	708	4,981	4,560	421	1,884	1,597	287
1968	7,753	7,248	505	5,691	5,397	295	2,062	1,852	210
1969	8,791	8,403	387	6,936	6,613	322	1,855	1,790	65
1970	9,290	9,247	43	7,180	7,181	(1)	2,109	2,066	44
1971	10,046	9,717	328	7,753	7,496	257	2,292	2,221	71
1972	11,163	10,578	584	8,652	8,158	493	2,512	2,420	91
1973	12,419	11,834	585	9,694	9,200	494	2,725	2,633	91
1974	14,703	13,978	725	11,546	10,761	785	3,157	3,218	(60)
1975	15,356	15,229	128	12,020	11,902	117	3,336	3,326	11
1976	17,503	16,781	721	13,899	13,324	575	3,605	3,457	147
1977	19,926	19,018	908	15,822	15,166	657	4,104	3,852	252
1978	22,892	21,527	1,366	18,189	17,172	1,018	4,703	4,355	348
1979	27,227	27,028	199	21,652	21,523	129	5,575	5,505	69
1980	33,728	33,949	(222)	26,404	26,409	(6)	6,543	6,766	(223)
1981	36,211	36,612	(401)	28,788	29,051	(264)	6,390	6,574	(184)
1982[r]	36,006	36,804	(739)	28,728	29,478	(750)	6,435	6,452	(17)
1983[c]	38,218	37,794	425	30,771	30,902	(131)	7,032	6,539	493

Source: Civil Aeronautics Board, Information Management Division.
NOTE: Detail may not add to totals because of rounding.
a Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.
b For 1980 and subsequent years, includes 'Other' operations not reported as 'Domestic' or 'International.'
c Excludes 4th quarter data for one Major and two National air carriers.
r Revised.

SOURCES OF OPERATING REVENUES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1969-1983
(Millions of Dollars)

Year	TOTAL Operating Revenues	Passenger Service[b]	Mail[c]	Freight[b] & Air Express	Excess Baggage	Other[c]
DOMESTIC OPERATIONS						
1969	$ 6,936	$ 6,097	$223	$ 523	$12	$ 81
1970	7,180	6,359	206	516	12	87
1971	7,753	6,849	227	549	14	114
1972	8,652	7,686	230	618	13	105
1973	9,694	8,518	263	703	14	196
1974	11,546	9,903	264	772	17	589
1975	12,020	10,301	253	792	19	655
1976	13,899	12,104	294	942	22	537
1977	15,822	13,773	355	1,109	21	564
1978	18,189	15,753	336	1,347	23	730
1979	21,652	18,931	417	1,485	28	791
1980	26,404	23,317	446	1,582	32	1,027
1981	28,788	25,504	497	1,659	36	1,091
1982[r]	28,728	25,440	524	1,505	42	1,218
1983	30,771	27,314	515	1,603	49	1,290
INTERNATIONAL OPERATIONS						
1969	$ 1,855	$ 1,386	$113	$ 326	$14	$ 17
1970	2,109	1,630	145	286	15	34
1971	2,292	1,731	124	385	16	37
1972	2,512	1,906	110	449	14	32
1973	2,725	2,112	109	438	15	51
1974	3,157	2,353	118	542	21	122
1975	3,336	2,469	122	591	25	129
1976	3,605	2,665	112	626	27	175
1977	4,104	3,047	112	710	21	215
1978	4,703	3,534	117	750	20	282
1979	5,575	4,271	131	837	23	313
1980	6,543	4,984	175	1,011	25	348
1981	6,390	4,917	165	984	25	299
1982	6,435	4,959	177	990[r]	25	284
1983	7,032	5,502	150	979	23	378

Source: Civil Aeronautics Board, Information Management Division.
NOTE: Detail may not add to totals because of rounding.
a Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.
b Scheduled and charter.
c Subsidy included with Mail through 1979, and then included in Other, which also includes revenues not related to transport, plus, beginning in 1981, transport revenues not specifically broken out by category by some small carriers.
r Revised.

OPERATING EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1969-1983
(Millions of Dollars)

Year	TOTAL Operating Expenses	Flying Operations	Maintenance	Passenger Service	Aircraft & Traffic Servicing	Promotion and Sales	Depreciation & Amortization	Other[b]
DOMESTIC OPERATIONS								
1969	$ 6,613	$ 1,948	$1,058	$ 645	$1,184	$ 771	$ 697	$ 311
1970	7,181	2,119	1,136	707	1,311	811	750	347
1971	7,496	2,255	1,130	742	1,394	839	754	382
1972	8,158	2,348	1,246	855	1,578	943	778	411
1973	9,200	2,638	1,408	968	1,835	1,057	839	456
1974	10,761	3,345	1,514	1,027	2,026	1,178	871	799
1975	11,902	3,919	1,611	1,117	2,158	1,271	891	936
1976	13,324	4,448	1,816	1,260	2,443	1,495	927	935
1977	15,166	5,288	2,001	1,401	2,728	1,713	967	1,008
1978	17,172	5,669	2,155	1,711	3,120	2,040	1,231	1,246
1979	21,523	7,998	2,457	2,091	3,702	2,564	1,373	1,337
1980	26,409	11,029	2,758	2,329	4,051	3,096	1,586	1,560
1981	29,051	12,037	2,822	2,522	4,497	3,708	1,723	1,742
1982[r]	29,478	11,529	2,709	2,668	4,665	4,160	1,876	1,869
1983	30,902	11,281	2,855	2,967	5,055	4,726	2,085	1,927
INTERNATIONAL OPERATIONS								
1969	$ 1,790	$ 521	$ 244	$ 186	$ 305	$ 264	$ 172	$ 98
1970	2,066	586	266	233	365	301	202	113
1971	2,221	646	287	248	395	313	206	126
1972	2,420	674	325	271	434	351	225	140
1973	2,633	752	338	302	501	368	225	148
1974	3,218	1,136	381	295	538	386	230	252
1975	3,326	1,175	392	292	565	422	225	254
1976	3,457	1,215	399	300	597	473	205	268
1977	3,852	1,303	450	351	668	526	253	301
1978	4,355	1,351	498	427	769	623	323	363
1979	5,505	1,960	571	538	922	774	352	388
1980	6,766	2,775	616	600	1,049	917	385	423
1981	6,574	2,757	540	583	932	945	382	435
1982[r]	6,452	2,596	512	577	893	954	396	525
1983	6,539	2,423	539	649	921	1,133	381	493

Source: Civil Aeronautics Board, Information Management Division.
NOTE: Detail may not add to totals because of rounding.
a Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.
b General and administrative, and other transport-related expenses.

U.S. AIR CARRIERS
TOTAL ASSETS AND INVESTMENT IN EQUIPMENT

Calendar Years 1964-1983
(Millions of Dollars)

Year	TOTAL Assets	Value of Flight Equipment	Value of Ground Property & Equipment, & Other[a]	Less: Reserves for Depreciation & Overhaul	Equals: Net Value of Owned Operating Property & Equipment	Investment in Operating Property and Equipment as a Percent of Total Assets
1964	$ 4,602	$ 4,524	$ 614	$ 2,109	$ 3,029	65.8%
1965	5,581	5,024	716	2,241	3,499	62.7
1966	7,310	6,096	856	2,457	4,495	61.5
1967	9,344	7,568	1,064	2,773	5,859	62.7
1968	10,992	9,021	1,269	3,009	7,281	66.2
1969	12,069	9,943	1,516	3,560	7,899	65.4
1970	12,913	10,950	1,951	4,120	8,782	68.0
1971	12,998	11,221	2,028	4,649	8,600	66.2
1972	13,635	11,918	2,225	5,115	9,028	66.2
1973	14,464	12,908	2,424	5,693	9,639	66.6
1974	15,200	13,538	2,539	6,252	9,826	64.6
1975	15,064	14,035	2,635	6,823	9,847	65.4
1976	15,454	14,399	2,792	7,585	9,605	62.2
1977	16,869	14,822	2,997	8,141	9,679	57.4
1978	20,745	16,127	3,367	8,799	10,696	51.6
1979	24,907	18,561	3,985	9,746	12,800	51.4
1980	28,900	20,859	4,682	10,309	15,233	52.7
1981	30,513	22,375	5,175	11,028	16,521	54.1
1982[r]	31,525	23,786	5,424	11,405	17,804	56.5
1983	33,566	25,253	5,960	12,282	18,931	56.4

Source: Civil Aeronautics Board, Information Management Division.
a Includes land and construction in progress.
r Revised.

TRAFFIC STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE[a]

Calendar Years 1960-1983

Year	Revenue Ton Miles (Millions)			Total Available Ton Miles (Millions)	Total Revenue Load Factor	Aircraft Revenue Miles (Millions)	Average Over-All Flight Stage Length (Miles)	Average Available Seats per Aircraft Mile
	Passen-ger	Cargo[b]	Total					
1960	3,733	996	4,729	9,001	52.5%	998	259	69
1961	3,827	1,144	4,971	10,041	49.5	970	259	79
1962	4,210	1,360	5,570	11,468	48.6	1,010	276	86
1963	4,839	1,507	6,346	13,257	47.9	1,095	289	91
1964	5,630	1,803	7,434	15,514	47.9	1,189	301	93
1965	6,629	2,356	8,986	18,408	48.8	1,354	322	96
1966	7,736	2,949	10,686	20,939	51.0	1,482	339	98
1967	9,561	3,475	13,036	26,968	48.3	1,834	371	101
1968	11,023	4,226	15,249	33,221	45.9	2,146	401	107
1969	12,197	4,701	16,898	38,664	43.7	2,385	443	112
1970	13,171	4,994	18,166	41,693	43.6	2,426	473	117
1971	13,565	5,120	18,685	44,139	42.3	2,378	476	125
1972	15,241	5,506	20,746	45,583	45.5	2,376	471	129
1973	16,196	6,046	22,242	49,019	45.4	2,448	477	135
1974	16,292	6,133	22,425	46,848	47.9	2,258	478	140
1975	16,281	5,905	22,186	47,254	46.9	2,241	476	143
1976	17,899	6,222	24,121	49,325	48.9	2,320	480	146
1977	19,322	6,587	25,909	52,284	49.6	2,419	490	149
1978	22,678	7,001	29,679	54,765	54.2	2,520	502	152
1979	26,202	7,189	33,390	60,844	54.9	2,791	517	154
1980	25,519	7,084	32,603	62,983	51.8	2,816	526	158
1981	24,889	7,060	31,949	61,186	52.2	2,703	519	161
1982	25,964	6,886	32,850	62,401	52.6	2,699	544	167
1983	28,131	7,566	35,696	65,249	54.7	2,798	559	169

Source: Civil Aeronautics Board, Information Management Division.
NOTE: Detail may not add to totals because of rounding.
a Includes international and domestic operations.
b Includes freight, air express, U.S. and foreign mail.

PASSENGER STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE
DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1969-1983

Year	Revenue Passenger Enplanements (Thousands)	Average Passenger Trip-Length (Miles)	Revenue Passenger Miles (Millions)	Available Seat Miles (Millions)	Revenue Passenger Load Factor[a]
DOMESTIC OPERATIONS					
1969	158,405	648	102,717	206,434	49.8%
1970	153,662	679	104,147	213,160	48.9
1971	156,195	681	106,438	221,503	48.1
1972	172,452	685	118,138	226,614	52.1
1973	183,272	689	126,317	244,699	51.6
1974	189,733	684	129,732	233,880	55.5
1975	188,746	698	131,728	241,282	54.6
1976	206,279	704	145,271	261,248	55.6
1977	222,283	705	156,609	280,619	55.8
1978	253,957	719	182,669	299,542	61.0
1979	292,700	714	208,891	332,796	62.8
1980	272,829	736	200,829	346,028	58.0
1981	265,304	749	198,715	346,172	57.4
1982[r]	274,342	766	210,149	359,528	58.5
1983	296,024	765	226,469	378,069	59.9
INTERNATIONAL OPERATIONS					
1969	13,493	1,683	22,703	44,412	51.1%
1970	16,260	1,695	27,563	51,960	53.0
1971	17,474	1,672	29,219	58,320	50.1
1972	18,897	1,813	34,268	60,797	56.4
1973	18,936	1,882	35,640	65,898	54.1
1974	17,725	1,872	33,186	63,126	52.6
1975	16,316	1,905	31,082	61,724	50.4
1976	17,039	1,979	33,717	61,574	54.8
1977	18,043	2,029	36,610	64,947	56.4
1978	20,759	2,125	44,112	69,209	63.7
1979	24,163	2,199	53,132	83,330	63.8
1980	24,074	2,258	54,363	86,507	62.8
1981	20,672	2,427	50,173	78,725	63.7
1982[r]	19,760	2,505	49,495	80,591	61.4
1983	21,881	2,506	54,837	85,307	64.3

Source: Civil Aeronautics Board, Information Management Division.
a Revenue passenger miles as a percent of available seat miles.

U.S. CIVIL AND JOINT-USE AIRCRAFT FACILITIES[a] BY TYPE AND STATE

As of December 31, 1983

State	TOTAL[a]	Public[b]	Paved	Lighted	State	TOTAL[a]	Public[b]	Paved	Lighted
Alabama	169	110	125	102	Nevada	126	71	55	26
Alaska	615	446	59	111	New Hampshire	54	29	31	20
Arizona	240	81	121	69	New Jersey	291	64	113	64
Arkansas	160	100	97	79	New Mexico	160	79	72	49
California	862	287	586	270	New York	476	194	186	137
Colorado	321	94	144	97	N. Carolina	284	128	119	105
Connecticut	105	28	60	29	N. Dakota	451	107	69	87
Delaware	37	12	13	15	Ohio	678	223	242	200
Dist. of Col.	16	2	13	5	Oklahoma	332	176	174	134
Florida	541	137	212	154	Oregon	341	111	133	85
Georgia	302	121	159	121	Pennsylvania	720	178	247	163
Hawaii	51	14	38	12	Rhode Island	18	8	11	7
Idaho	196	124	62	44	S. Carolina	137	72	64	63
Illinois	909	122	192	174	S. Dakota	165	79	49	76
Indiana	498	131	131	121	Tennessee	169	94	102	83
Iowa	280	157	125	154	Texas	1,543	422	733	413
Kansas	380	161	124	146	Utah	95	51	62	43
Kentucky	127	73	84	61	Vermont	60	20	17	10
Louisiana	311	96	162	76	Virginia	270	85	116	85
Maine	146	81	41	32	Washington	382	142	168	130
Maryland	147	48	64	51	W. Virginia	94	43	55	33
Massachusetts	130	54	82	44	Wisconsin	416	156	128	135
Michigan	422	231	160	168	Wyoming	104	48	45	34
Minnesota	492	163	107	141	**50 States-Total**	15,966	5,950	6,400	4,859
Mississippi	181	100	99	79	Puerto Rico	31	12	27	11
Missouri	419	158	171	142	Virgin Islands	6	2	2	2
Montana	197	127	83	84	S. Pacific[c]	26	23	12	6
Nebraska	346	112	95	96	**TOTAL**	16,029	5,987	6,441	4,878

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

a 16,029 aircraft facilities consist of 12,653 airports (5,628 for public use and 7,025 for private use), 2,918 heliports (124 for public use and 2,794 for private use), 66 stolports (10 for public use and 56 for private use), and 392 seaplane bases (225 for public use and 167 for private use). Included in these data are facilities having joint civil-military use.

b 'Public' refers to use, whether publicly or privately owned.

c American Samoa, Guam, and Trust Territories.

ACTIVE MULTI-ENGINE U.S. AIR CARRIER FLEET

By Type of Aircraft, Number of Engines and Model
Active as of December 1979-1983

	1979	1980	1981	1982	1983
TOTAL	3,609	3,808	3,970[r]	4,072[r]	4,203
Turbojets—TOTAL	2,486	2,531	2,511	2,674	2,767
Four-Engine—TOTAL	517	441	365	354	309
Boeing 707/720	182	149	68	56	25
Boeing 747	131	144	147	144	146
B.Ae. 146	—	—	—	—	3
B.Ae. Aerospatiale Concorde	9[a]	—	—	—	—
Convair 880(22)/990(30)	6	6	6	3	2
Lockheed L-1329	1	—	—	—	—
McDonnell Douglas DC-8	188	142	144	151	133
Three-Engine—TOTAL	1,256	1,347	1,363	1,387	1,393
Boeing 727	1,029	1,092	1,096	1,110	1,122
Lockheed L-1011	87	102	106	111	116
McDonnell Douglas DC-10	140	153	161	166	155
Twin-Engine—TOTAL	713	743	783	933	1,065
Airbus A-300	12	19	25	30	34
Boeing 737	206	220	236	290	348
Boeing 757	—	—	—	2	15
Boeing 767	—	—	—	13	49
B.Ae. BAC-111	28	27	27	36	36
Canadair CL600	—	—	—	1	—
Cessna C500 Citation I	4	5	1	2	1
Dassault MD-20, Falcon	44	42	27	23	12
Fokker F-28	—	5	9	11	6
Grumman G-1159	6	5	3	2	1
Hamburger Flugzeugbau HF-320	4	—	—	—	1
Hawker-Siddeley HS125	—	—	—	2	—
Israel Westwind 1123/1124	2	1	—	1	—
Learjet LR-23/LR-24	8	5	3	4	—
Learjet LR-25	6	7	1	—	—
Learjet LR-35	4	3	—	3	4
Learjet LR36	—	—	—	1	—
McDonnell Douglas DC-9/MD-80	381	394	447	509	557
Rockwell NA-265 Sabreliner	2	2	—	1	—
Sud Aviation SE210 Caravelle	6	5	2	2	1
Sud Aviation SN601	—	3	2	—	—
Turboprops—TOTAL	565	682	852	826	876
Four-Engine—TOTAL	81	92	105	116	99
Canadair CL44D	1	2	4	4	2
De Havilland DHC-7	8	18	29	43	46
Lockheed 188 Electra	52	52	51	47	37

(Continued on next page)

ACTIVE MULTI-ENGINE U.S. AIR CARRIER FLEET

By Type of Aircraft, Number of Engines and Model (Continued)

	1979	1980	1981	1982	1983
Four-Engine (continued)					
Lockheed 382/L-100 Hercules	20	20	20	19	11
Vickers V745	—	—	1	3	3
Twin-Engine—TOTAL	484	590	747	710	777
Beech BE99	85	87	102	108	101
Beech BE90	3	2	2	4	2
Beech BE200	4	1	2	2	4
Beech STC 18	—	—	—	—	1
Beech 100	—	—	—	—	1
CASA C212 Aviocar	—	2	15	16	28
Cessna C441	—	1	—	2	1
Convair 580/600/640	120	119	251	98	100
DeHavilland DHC-6	78	107	96	101	112
Embraer EMB110	4	34	66	83	83
Fairchild/Fokker F-27/FH-227	28	15	16	23	35
Fairchild Swearingen SA-226	66	100	72	105	99
Fairchild Swearingen SA-227	—	—	4	26	55
GAF N22/N24 Nomad	1	9	3	2	—
Grumman G-73	—	—	1	4	4
Grumman G-159	15	16	17	19	16
Handley Page HP-137	16	15	12	12	10
Hawker-Siddeley HS748	1	2	2	5	5
Israel Aircraft AR101B	—	—	2	3	—
Mitsubishi MU-2	—	—	—	—	2
Nihon YS-11	18	22	27	27	35
Nord ND-262/STC-262	24	22	15	15	9
Piper PA31T	—	—	1	1	6
Rockwell Aero Commander 690	—	—	—	—	1
Short SD-3/SD-330	21	34	39	52	66
Short SC-7	—	2	2	2	1
Piston-Engine—TOTAL	557	593	606	569	551
Four-Engine—TOTAL	58	73	68	57	52
DeHavilland DHC-114	7	27	21	16	11
Douglas DC-4	4	5	6	3	3
Douglas DC-6	46	41	41	38	38
Lockheed 1049	1	—	—	—	—
Twin-Engine—TOTAL	499	520	535	510	499
Helicopters—TOTAL	1	2	4	5	9

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Effective 1978, includes certified route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1979, includes multi-engine aircraft in passenger service of commuters. "Active aircraft" must have a current U.S. registration and have been flown during the calendar year.

a Aircraft in use by foreign airlines and registered in the United States to carry passengers between two U.S. cities.

r Revised. Data in previous editions included single-engine piston aircraft.

ACTIVE U.S. CIVIL AIRCRAFT[a]

As of December 31, 1960-1982

Year	TOTAL	Air Carrier[b]	General Aviation Aircraft					
			TOTAL	Fixed-Wing Aircraft			Rotor-craft[c]	Other[d]
				Multi-Engine	Single-Engine			
					4-place & over	3-place & less		
1960	78,684	2,135	76,549	7,243	34,829	33,472	634	371
1961	82,736	2,104	80,632	8,401	38,206	32,800	798	427
1962	86,168	2,047	84,121	9,186	41,120	32,341	967	507
1963	87,167	2,079	85,088	9,695	42,647	30,977	1,171	588
1964	90,823	2,081	88,742	10,644	45,777	30,367	1,306	648
1965	97,567	2,125	95,442	11,977	49,789	31,364	1,503	809
1966	106,978	2,272	104,706	13,548	52,972	35,687	1,622	877
1967	116,638	2,452	114,186	14,651	56,865	39,675	1,899	1,096
1968	126,823	2,586	124,237	16,760	60,977	42,830	2,350	1,320
1969	133,496	2,690	130,806	18,111	63,703	45,001	2,557	1,434
1970	134,422	2,679	131,743	18,291	64,759	44,884	2,255	1,554
1971	133,790	2,642	131,148	17,855	64,464	44,792	2,352	1,685
1972	147,593	2,583	145,010	19,849	70,998	49,448	2,787	1,928
1973	156,139	2,599	153,540	21,929	74,831	51,386	3,143	2,251
1974	163,974	2,472	161,502	23,418	78,924	53,008	3,610	2,542
1975	170,970	2,495	168,475	24,559	82,621	54,390	4,073	2,832
1976	180,796	2,492	178,304	25,684	88,211	56,730	4,505	3,174
1977	186,767	2,473	184,294	26,652	91,960	57,340	4,726	3,616
1978	201,323	2,545	198,778	28,782	101,466	59,185	5,315	4,028
1979	213,948	3,609	210,339	31,311	106,028	62,362	5,864	4,770
1980	214,853	3,808	211,045	31,664	107,930	60,505	6,001	4,945
1981	217,199	3,973	213,226	33,301	107,983	59,914	6,974	5,049
1982	213,853	4,074	209,779	33,228	106,503	57,670	6,169	6,209

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of estimating procedures.

a Before 1971, an active aircraft was one certified as eligible to fly. Currently, an "active aircraft" must have a current U.S. registration and have been flown during the previous calendar year.

b Effective 1978, includes certificated route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1979, includes multi-engine aircraft in passenger service of commuters.

c Includes autogiros; excludes air carrier helicopters.

d Includes gliders, dirigibles and balloons.

ACTIVE U.S. CIVIL AIRCRAFT BY PRIMARY USE AND TYPE OF AIRCRAFT

As of December 31, 1982

Primary Use[a]	TOTAL	Fixed Wing			Rotorcraft[b]	Other[c]
		Turbojet	Turboprop	Piston		
TOTAL—ALL AIRCRAFT	213,853	6,670	6,013	189,763	6,174	5,233
Air Carrier—TOTAL	4,074	2,674	827	568	5	—
Certificated Route Air Carriers	2,468	2,377	88	3	—	—
Supplemental Air Carriers	182	103	60	19	—	—
Commercial Operators	49	24	11	14	—	—
Air Taxis	105	36	34	35	—	—
Commuters	1,112	45	602	460	5	—
All Cargo	155	87	31	37	—	—
Air Travel Clubs	3	2	1	—	—	—
General Aviation—TOTAL	209,779	3,996	5,186	189,195	6,169	5,233
Executive	15,739	3,054	3,327	8,115	1,238	4
Business	47,873	231	570	46,707	352	13
Commuter[d]	1,070	63	296	711	—	—
Air Taxi[d]	8,122	393	499	5,932	1,227	71
Instructional	14,708	—	—	13,634	457	616
Rental	9,844	—	34	9,401	29	380
Personal	94,820	47	32	90,882	486	3,373
Aerial Application	7,155	—	101	6,261	793	—
Aerial Observation	4,164	—	26	3,324	715	98
Other Work	1,733	—	6	1,256	300	172
Other	4,546	207	295	2,969	571	505

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).
NOTE: Detail may not add to totals because of estimating procedures.
a Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."
b Includes helicopters and autogiros.
c Includes gliders, dirigibles and balloons.
d Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories included with "air carriers."

U.S. GENERAL AVIATION
ACTIVE AIRCRAFT AND HOURS FLOWN
BY PRIMARY USE

Calendar Years 1978-1982

Primary Use[a]	1978	1979	1980	1981	1982
ACTIVE AIRCRAFT AS OF DECEMBER 31					
TOTAL	198,778	210,339	211,045	213,226	209,779
Executive	12,666	13,638	14,860	18,582	15,739
Business	42,809	49,658	49,391	47,716	47,873
Commuter	7,936	8,399	944	1,023	1,070
Air Taxi			7,615	7,226	8,122
Instructional	14,742	15,456	14,862	14,993	14,708
Rental	8,189	12,771	11,829	10,585	9,844
Personal	96,209	94,427	96,222	95,510	94,820
Aerial Application[c]	16,226	15,989	15,323	7,976	7,155
Aerial Observation[c]				3,384	4,164
Other Work[c]				1,491	1,733
Other[c]				4,741	4,546
THOUSANDS OF HOURS FLOWN					
TOTAL	39,290	43,340	41,016	40,704	36,457
Executive	4,882	5,001	5,332	6,190	4,983
Business	8,014	8,979	8,434	8,122	6,861
Commuter[b]	4,424	4,573	961	979	1,086
Air Taxi[b]			3,535	2,809	3,187
Instructional	5,009	6,462	5,748	5,597	4,924
Rental	3,284	4,206	3,917	3,768	2,961
Personal	9,601	9,471	8,894	8,241	8,182
Aerial Application[c]	4,076	4,544	4,105	2,447	2,043
Aerial Observation[c]				1,402	1,256
Other Work[c]				369	467
Other[c]				769	638

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of rounding and estimating procedures.

a Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

b Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories classified as "air carriers."

c Prior to 1981, reported as Aerial Application (differently defined), Industrial, and Other.

ACTIVE U.S. AIRMAN CERTIFICATES HELD

As of December 31, 1979-1983

	1979	1980	1981	1982	1983
Pilots—TOTAL	814,667	827,071	764,182	733,255	718,004
Students	210,180	199,833	179,912	156,361	147,197
Private	343,276	357,479	328,562	322,094	318,643
Commercial	182,097	183,442	168,580	165,093	159,495
Airline Transport	63,652	69,569	70,311	73,471	75,938
Helicopter (only)	5,218	6,030	6,453	7,034	7,237
Glider (only)[a]	6,796	7,039	7,388	7,842	8,157
Other Pilot[a]	3,448	3,679	2,976	1,360	1,337
Non-Pilots—TOTAL	377,213	393,486	398,368	420,595	432,890
Mechanics[b]	237,611	250,157	262,705	277,436	288,335
Parachute Rigger[b]	9,381	9,547	9,716	9,893	10,074
Ground Instructor[b]	59,680	61,550	63,246	65,004	66,385
Dispatcher[b]	6,446	6,799	7,094	7,580	8,223
Control Tower Operator	25,232	25,130	15,528	20,934	19,691
Flight Navigator	1,994	1,936	1,785	1,695	1,636
Flight Engineer	36,869	38,367	38,294	38,053	38,546
Flight Instructor Certificates[c]	54,398	60,440	57,523	62,492	62,201
Instrument Ratings[c]	247,096	260,461	252,535	255,073	254,271

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

a Glider and lighter-than-air pilots are not required to have a medical examination; however, the totals above are the pilots who received a medical.

b No periodic medical examination required; therefore, no determination as to current activity can be made.

c Special ratings shown on pilot certificates represented above, not additional certificates.

helicopter transportation

Although production of new helicopters was at its lowest level in more than two decades, use of the helicopter as a civil transportation vehicle continued to grow in 1983/84, as evidenced by an increase in the number of helicopter facilities in operation. The number reached 4,232 in the spring of 1984, according to the 1984 AIA Directory of Heliports/Helistops in the United States, Canada and Puerto Rico; the directory is compiled and published by Aerospace Industries Association.

The 4,232 facilities includes land-based heliports and helistops, but not offshore oil rigs in American waters, which are separately reported. The figure for 1984 compares with 3,985 facilities in 1981, the last prior year in which the directory was published. Of the 1984 total, 385 are rooftop facilities and 3,847 are at ground level. Only 333—eight percent—of the total 4,232 facilities are for public use, 15 fewer than in 1981; 1,071 are hospital heliports/helistops and there are 2,789 private or "prior permission" facilities that are available for public use in emergencies.

The Middle Atlantic region of the United States led the nation in heliport/helistop availability with 793 facilities in the 1984 survey; this compares with 727 in 1981. In second place was the East North Central region with 640 (down 78). Facilities in the Pacific region fell by more than 100 to 634, dropping Pacific from first place in 1981 to third in 1984. Other regions ranking high in heliport/helistop availability were West South Central (551) and South Atlantic (511). Canada had 147 facilities, Puerto Rico 65.

The 1,071 hospital heliports/helistops represent an increase of more than 18 percent over the 905 reported in 1981. The geographical distribution among hospitals differs from the national pattern. The East North Central region, although its number of facilities remained the same at 193, held on to first place. In second was South Atlantic, which added 41 facilities since the 1981 survey; third was the Pacific region with 167 (up 32).

The 1984 survey showed 78 hospitals operating helicopter ambulance services, compared with 46 in 1981. In addition, police and transportation agencies in eight states and the District of Columbia provide emergency helicopter ambulance service, and there are 23 other states that have one or more agencies operating ambulance helicopters.

In addition to the 4,232 land facilities reported in the survey, there were helicopter facilities aboard 261 offshore oil rigs as of May 1984. More than 90 percent of them were located in the Gulf states of Louisiana, which had 171 offshore facilities, and Texas, which had 66. Inclusion of offshore platforms would bring the grand total of U.S. helicopter facilities to 4,493.

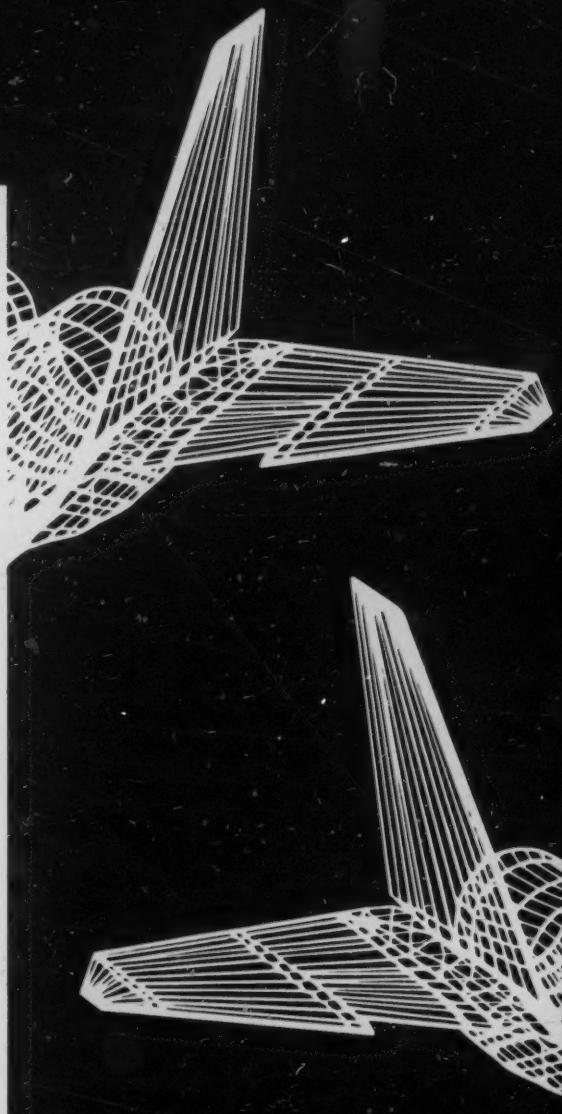
The increase in the number of heliports/helistops reflects not only greater activity in traditional employment of the helicopter, but also growth in a variety of new business uses and destinations. In addition to the customarily large users of rotary wing services—hospitals, police/fire departments, oil producers, newspapers and TV stations—there are now facilities at hotels, motels, garages, shopping centers, department stores, convention centers, colleges and universities, companies engaged in insurance, construction, steel manufacture and mining, cosmetic firms and even prison farms and zoos. In some metropolitan areas, public helistops (like bus stops) provide ready access to downtown business districts.

In 1983, the rotary wing segment of the aerospace industry produced 401 civil

helicopters, down from 587 in 1982 and the lowest number in 20 years. Dollar value in 1983 was $269 million, down from $365 million in 1982 and $656 million in the peak year 1980. Major commercial helicopter types in production included the Sikorsky S-76 and Bell Helicopter Textron Model 222 twin-turbine transports, the Boeing Vertol 44-passenger Model 234, the Bell 206 and the Hughes 500. Bell Helicopter Textron started development of the Model 400 TwinRanger, a seven-seater with a four-blade main rotor made of composite materials, to be produced in Canada; first deliveries were planned for 1985. Bell also introduced to service with hospitals the Med/Air 222UT medical transport.

Among other industry development of 1983/84,

- Hughes Helicopters, Inc. and Schweizer Aircraft Corporation completed an agreement whereby Schweizer manufactures and provides product support for the Hughes Model 300 series helicopters. Schweizer delivered the first Model 300C in July 1984. Hughes' 500E was selected as the official helicopters for the Los Angeles Olympics.
- Bell Helicopter Textron was selected by the Canadian government to establish a helicopter industry in Canada. The company also announced formation of the Singapore-based Bell Helicopter Asia, a joint venture of Bell Helicopter Textron and Inchcape Aviation Corporation of Singapore.
- Sikorsky Aircraft and the Spanish firm Construcciones Aeronauticas, S.A. (CASA) signed an agreement to establish a long-term helicopter industrial cooperation program in Spain. Sikorsky also concluded an arrangement whereby its S-61 helicopter, no longer built in the U.S. will be produced in Italy under license by Agusta S.p.A.



CIVIL HELICOPTER OPERATORS AND HELICOPTERS OPERATED IN THE UNITED STATES, CANADA, MEXICO AND PUERTO RICO[a]

Selected Years 1965-1982

Year	TOTAL	Commercial	Corporate and Executive	Civil Government Agencies[b]
CIVIL HELICOPTER OPERATORS				
1965	860	508	299	53
1966	933	519	353	61
1967	1,023	522	427	74
1969	1,379	689	596	94
1971	1,424	672	590	162
1972	1,491	758	566	167
1973	1,532	752	599	181
1974	1,536	725	608	203
1975	1,891	779	833	279
1976	2,330	911	1,082	337
1977	2,547	959	1,219	369
1978	3,003	1,126	1,515	362
1980[d]	2,573	1,065	1,160	348
1982[e]	2,688	1,188	1,158	342
HELICOPTERS OPERATED[c]				
1965	2,053	1,537	401	115
1966	2,318	1,699	475	144
1967	2,438	1,764	487	187
1969	3,433	2,390	770	273
1971	3,874	2,605	802	467
1972	4,185	2,992	745	448
1973	4,601	3,295	780	526
1974	4,819	3,418	778	623
1975	5,222	3,342	1,056	824
1976	6,181	3,702	1,392	1,087
1977	7,160	4,294	1,578	1,288
1978	8,023	4,904	1,891	1,228
1980[d]	8,575	5,581	1,635	1,360
1982[e]	8,884	5,874	1,728	1,282

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada, Mexico and Puerto Rico, 1982/83."

a Effective 1982, includes Mexico.

b Federal, state and local governments.

c Includes some helicopters on order.

d Because computerization of Directory data resulted in the elimination of some duplication of operator and helicopter listings, 1980 and subsequent data are not comparable with those of previous years.

e Latest available data.

HELIPORTS AND HELISTOPS[a] IN THE UNITED STATES, CANADA AND PUERTO RICO

By Region
Selected Years 1973-1984

Region	1973	1975	1977	1981	1984
TOTAL	2,384	3,268	3,433	3,985	4,232
Elevated Facilities	241	277	299	319	385
New England	78	143	164	168	172
Middle Atlantic	581	684	795	727	793
East North Central	307	411	397	718	640
West North Central	110	98	107	184	215
South Atlantic	204	352	306	416	511
East South Central	64	107	144	203	192
West South Central	217	338	339	409	551
Mountain	176	241	213	268	312
Pacific	551	789	821	734	634
Puerto Rico	24	30	73	71	65
Canada	72	75	74	107	147

Source: Aerospace Industries Association, "Directory of Heliports/Helistops in the U.S., Canada, Puerto Rico, 1984."
a Excludes offshore oil platforms and rigs, which numbered 261 as of May 1984.

HOSPITAL HELIPORTS IN THE UNITED STATES, CANADA AND PUERTO RICO

By Region
Selected Years 1973-1984

Region	1973	1975	1977	1981	1984
TOTAL	384	565	699	905	1,071
New England	5	16	21	31	30
Middle Atlantic	42	55	73	93	107
East North Central	99	126	150	193	193
West North Central	21	22	29	69	97
South Atlantic	50	76	82	135	176
East South Central	18	29	54	171	76
West South Central	26	59	67	77	110
Mountain	32	56	67	88	98
Pacific	87	119	147	135	167
Puerto Rico	—	—	2	2	3
Canada	4	7	7	11	14

Source: Aerospace Industries Association, "Directory of Heliports/Helistops in the U.S., Canada, Puerto Rico, 1984."

CIVIL HELICOPTER FLEET
UNITED STATES, CANADA, MEXICO AND PUERTO RICO
1982[a]

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
Alabama	44	13	20	11	333	24	29	280
Alaska	41	27	8	6	329	311	10	8
Arizona	71	39	25	7	211	143	42	26
Arkanasas	16	8	5	3	32	19	8	5
California	330	159	122	49	904	495	199	210
Colorado	73	30	34	9	208	130	54	24
Connecticut	15	2	13	—	26	6	20	—
Delaware	7	2	4	1	8	2	4	2
Dist. of Col.	7	1	—	6	23	1	—	22
Florida	168	72	59	37	538	355	89	94
Georgia	32	14	9	9	71	31	9	31
Hawaii	21	17	3	1	48	40	6	2
Idaho	40	18	16	6	91	59	20	12
Illinois	52	24	18	10	148	77	48	23
Indiana	46	20	16	10	86	43	21	22
Iowa	24	11	8	5	37	15	9	13
Kansas	19	9	7	3	38	19	11	8
Kentucky	47	10	35	2	74	26	43	5
Louisiana	58	28	20	10	840	763	55	22
Maine	9	4	4	1	20	10	6	4
Maryland	16	7	6	3	55	33	6	16
Massachusetts	24	12	10	2	55	24	28	3
Michigan	56	22	23	11	97	43	29	25
Minnesota	33	17	15	1	55	34	17	4
Mississippi	14	5	3	6	28	11	3	14
Missouri	27	13	8	6	80	51	13	16
Montana	25	16	4	5	58	44	4	10
Nebraska	19	6	11	2	34	16	16	2
Nevada	27	12	10	5	62	35	18	9
New Hampshire	9	5	4	—	20	12	8	—
New Jersey	66	23	37	6	131	70	46	15
New Mexico	21	7	12	2	35	15	15	5

(Continued on next page)

CIVIL HELICOPTER FLEET
UNITED STATES, CANADA, MEXICO AND PUERTO RICO (Continued)

1982[a]

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
New York	96	31	54	11	264	148	83	33
North Carolina	21	6	12	3	47	21	14	12
North Dakota	17	14	3	—	32	29	3	—
Ohio	78	28	43	7	138	75	44	19
Oklahoma	39	18	19	2	141	94	32	15
Oregon	90	50	36	4	386	323	46	17
Pennsylvania	107	37	69	1	208	110	88	10
Rhode Island	6	4	1	1	14	11	2	1
South Carolina	22	5	12	5	49	30	13	6
South Dakota	8	3	2	3	12	4	5	3
Tennessee	51	17	25	9	111	50	27	34
Texas	207	88	104	15	638	381	207	50
Utah	24	17	6	1	151	141	9	1
Vermont	3	—	3	—	3	—	3	—
Virginia	35	12	16	7	58	24	18	16
Washington	85	46	32	7	182	127	38	17
West Virginia	48	10	34	4	63	16	39	8
Wisconsin	16	6	7	3	58	46	7	5
Wyoming	22	14	8	—	47	39	8	—
Puerto Rico	9	1	3	5	11	1	3	7
U.S. Total	2,441	1,060	1,058	323	7,388	4,627	1,575	1,186
Canada	244	125	100	19	1,464	1,215	153	96
Mexico	3	3	—	—	32	32	—	—
TOTAL	2,688	1,188	1,158	342	8,884	5,874	1,728	1,282

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States,Canada, Mexico and Puerto Rico, 1982/83".

a Latest available data.

research and development

National spending for aerospace research and development, including both federal and company funding, will increase substantially in 1984, according to estimates by McGraw-Hill Publications Company. Total aerospace R&D funding will amount to $17.9 billion, which compares with $16.4 billion in 1983. The 1984 figure is compounded of $12.9 billion in federal funding and $5 billion in company funds; comparable figures for the previous year were $11.8 billion (federal) and $4.6 billion (company).

In terms of percentages, aerospace R&D increased by 16.7 percent in 1983 and will go up an additional 9.4 percent in 1984. In both cases, the increases are well above the average gain for all U.S. business, which was estimated by McGraw-Hill as 11.1 percent in 1983 and 8.3 percent in 1984.

The 1983/84 aerospace figures represent 25 percent of R&D funding (federal and company) for work performed by all U.S. businesses during those years. The McGraw-Hill estimate for all-industry R&D funding in 1984, including company money and federal funding, is $71 billion. Aerospace ($17.9 billion) ranks first among U.S. industries in 1984, as it did in 1983. Second in the 1984 estimates is the electrical machinery industry at $15.2 billion, followed by non-electrical machinery ($8.8 billion), chemicals ($8.2 billion) and automotive ($6.1 billion).

McGraw-Hill's projection for the longer term indicates that industrial R&D growth will be on the order of nine percent annually (all-industry average) in the period 1984-87. The survey estimates that aerospace expenditures will reach $24.5 billion a year by 1987 and that aerospace will continue to lead U.S. industries. The 1984-87 aerospace increase will amount to 36.6 percent, compared with an average for all U.S. businesses of 27.2 percent.

McGraw-Hill's estimates, combined with historical data supplied by the National Science Foundation, indicate that aerospace R&D funding increased more rapidly over the first four years of this decade than did all-industry R&D. The 1983 aerospace total is almost double the 1980 level; the all-industry gain over the same span is about 60 percent.

Government budget estimates show large FY 1984/85 increases in federal outlays for all research and development activities, including industry-performed and government-performed R&D. The estimate for FY 1984 is $42.7 billion, up $6.1 billion—16.8 percent—above the FY 1983 level. Overall federal outlays in FY 1985 are estimated at $48.7 billion, which would amount to an increase of 14 percent. The increases are due for the most part to sharply climbing R&D outlays by the Department of Defense. DoD outlays in FY 1984 are estimated at $25.3 billion, up from $21.1 billion in the previous year. The projected figure for FY 1985 is $31.1 billion, which would mean a gain of almost 23 percent.

A DoD analysis of outlays for defense research, development, test and evaluation (RDT&E) shows that the Air Force is conducting by far the greatest RDT&E effort, as measured by dollar value. Air Force outlays for FY 1984 amount to $11.8 billion, compared with $6.8 billion for the Navy and $4 billion for the Army. The rankings remain the same in a projection for FY 1985, which estimates Air Force outlays at $13.6 billion, the Navy's at $8.6 billion and the Army's at $4.6 billion.

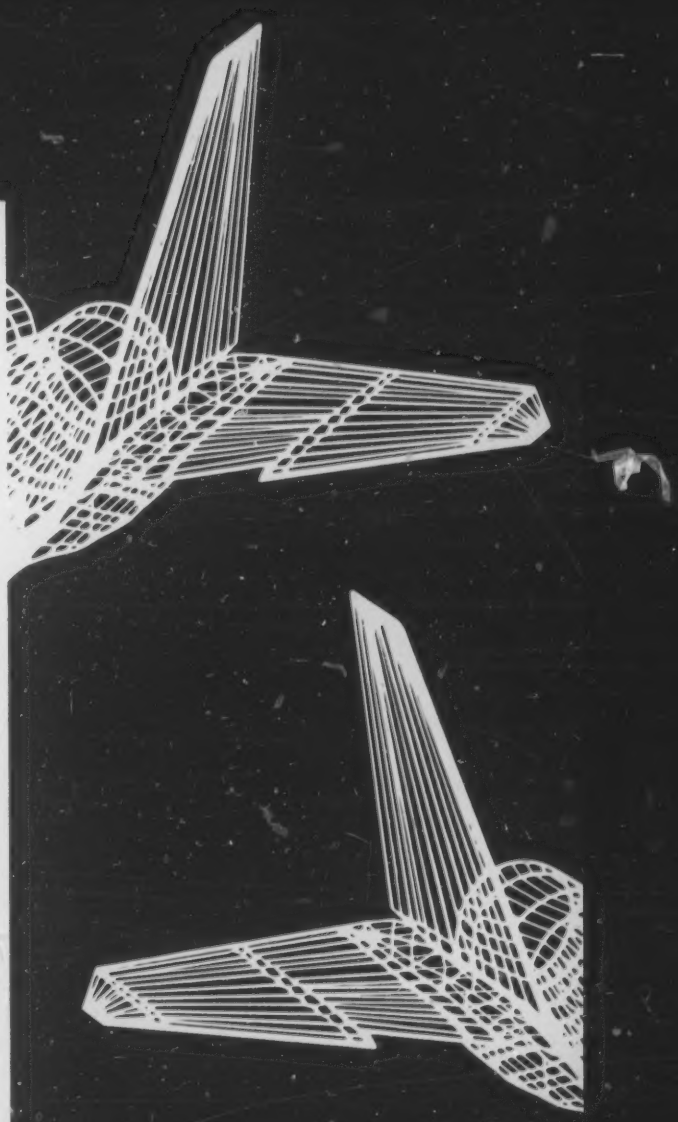
In FY 1983, the latest year for which data are available, DoD awarded prime contracts for RDT&E totaling $16.3 bil-

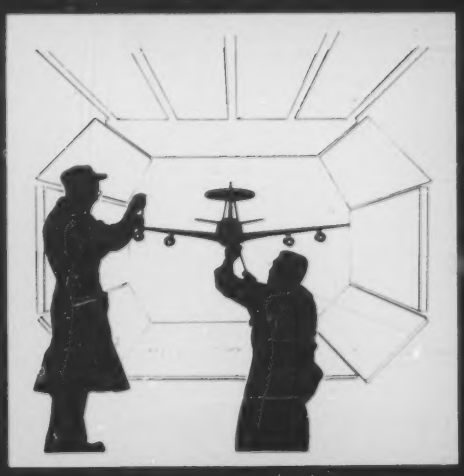
lion, up from $14.9 billion in the previous year. A breakdown shows that missile/space work was the largest area of RDT&E activity, with contract awards totaling $6.4 billion. Other elements of the breakdown include $4.7 billion for electronic and communications equipment, $2.1 billion for aircraft and $3.1 billion in all other RDT&E categories.

Pacific coast contractors—including business firms, educational institutions and other non-profit institutions—dominated a geographical breakdown with 44.5 percent of FY 1983 DoD contract awards for RDT&E. In second place was the South Atlantic region (12.4 percent) and in third New England (11.2 percent).

NASA funding for R&D activities increased sharply from $2.5 billion in FY 1983 to $3.5 billion in FY 1984. A budget projecton for FY 1985 shows a decline in NASA R&D to $3.3 billion, reflecting reduced R&D on the Space Shuttle, which will become fully operational with the 1985 introduction to service of the fourth Orbiter, *Atlantis.* NASA R&D outlays are expected to climb significantly in the latter years of this decade as the space station program gains momentum.

Federal budget authority for aeronautics R&D continued on the upward curve in evidence since 1980. Total FY 1983 budget authority for DoD, NASA and the Federal Aviation Administration (Department of Transportation) amounted to $4.3 billion, up from $3.6 billion in the previous year; almost all of the increase was in DoD funding, $3.7 billion, up $680 million. Estimates for FY 1984 show total budget authority of $5 billion, about 14 percent above the FY 1983 level. A breakdown for FY 1984 lists DoD budget authority at $4.1 billion (up $415 million), NASA at $589 million (up $36 million) and the FAA at $286 million, more than double the previous year's figure.





FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1972-1984
(Millions of Dollars)

Year	All Industries[a]			Aerospace Industry[b]		
	Total	Federal Funds	Company Funds[c]	Total	Federal Funds	Company Funds[c]
CURRENT DOLLARS						
1972	$19,552	$ 8,017	$11,535	$ 4,950	$3,970	$ 978
1973	21,249	8,145	13,104	5,052	3,899	1,154
1974	22,887	8,220	14,667	5,278	4,000	1,278
1975	24,187	8,605	15,582	5,713	4,428	1,285
1976	26,997	9,561	17,436	6,339	4,921	1,418
1977	29,825	10,485	19,340	7,033	5,486	1,547
1978	33,304	11,189	22,115	7,536	5,713	1,823
1979	38,226	12,518	25,708	8,041	5,840	2,201
1980	44,505	14,029	30,476	9,198	6,628	2,570
1981	51,858	16,382	35,476	11,968	8,528	3,440
1982	59,011	19,059	39,952	14,045	10,151	3,895
1983[E]	64,600	20,900	43,700	16,385	11,841	4,544
1984[E]	72,000	23,350	48,650	17,923	12,953	4,970
CONSTANT DOLLARS (1972 = 100)[e]						
1972	$19,552	$ 8,017	$11,535	$ 4,950	$3,970	$ 978
1973	20,094	7,702	12,391	4,777	3,687	1,091
1974	19,888	7,143	12,745	4,586	3,476	1,111
1975	19,228	6,841	12,387	4,542	3,520	1,022
1976	20,400	7,225	13,175	4,790	3,718	1,071
1977	21,296	7,487	13,809	5,022	3,917	1,105
1978	22,141	7,439	14,702	5,010	3,798	1,212
1979	23,391	7,660	15,731	4,920	3,574	1,347
1980[r]	24,944	7,863	17,081	5,155	3,715	1,440
1981[r]	26,575	8,395	18,180	6,133	4,370	1,763
1982[r]	28,524	9,213	19,312	6,789	4,907	1,883
1983[E]	29,959	9,693	20,266	7,599	5,491	2,107
1984[E]	31,943	10,359	21,584	7,952	5,747	2,205

Source: National Science Foundation, for historical data and All Industries estimates; McGraw-Hill Publications Company for Aerospace Industry Total estimates; AIA for Aerospace Industry Federal/Company estimates.

NOTE: Detail may not add to totals because of rounding.

a Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

b Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

c Company funds include all funds for industrial R&D work performed within company facilities except funds provided by the Federal Government. Excluded are company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

d The McGraw-Hill estimates for All Industries are $65,516 million for 1983 and $70,962 million for 1984.

e Based on GNP implicit price deflator.

E Estimate.

r Revised.

FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT[a] BY INDUSTRY

Calendar Years 1982-1984
(Millions of Dollars)

Industry	Current Dollars[a]			Constant Dollars[b]		
	1982[p]	1983[E]	1984[E]	1982[p]	1983[E]	1984[E]
ALL BUSINESS	$58,960	$65,516	$70,962	$28,500	$30,384	$31,483
ALL MANUFACTURING	56,792	64,448	69,949	27,452	29,888	31,033
Aerospace	$14,045	$16,385	$17,923	$ 6,789	$ 7,599	$ 7,952
Electrical Machinery	11,925	14,310	15,240	5,764	6,636	6,761
Non-Electrical Machinery	7,879	8,097	8,845	3,808	3,755	3,924
Chemicals	6,588	7,308	8,186	3,184	3,389	3,632
Autos, Trucks & Parts	4,962	5,782	6,071	2,398	2,681	2,693
Instruments	4,047	4,526	5,109	1,956	2,099	2,267
Petroleum	2,248	2,213	2,265	1,087	1,026	1,005
Rubber & Plastic	888	1,491	1,691	429	691	750
Food & Beverage	752	797	879	363	370	390
Paper & Pulp	626	532	560	302	247	248
Fabricated Metals	570	636	717	276	295	318
Iron & Steel	510	452	434	247	210	193
Stone, Clay & Glass	460	517	528	222	240	234
Nonferrous Metals	325	307	350	157	142	155
Textiles	129	142	149	62	66	66
Other Manufacturing	838	952	1,004	405	441	445

Industry	Percent Change-Current Dollars			Percent Change-Constant Dollars		
	1981-82	1982-83	1983-84	1981-82	1982-83	1983-84
ALL BUSINESS	13.8%	11.1%	8.3%	7.3%	6.6%	3.6%
ALL MANUFACTURING	14.2	13.5	8.5	7.7	1.9	3.8
Aerospace	20.0%	16.7%	9.4%	13.2%	11.9%	4.6%
Electrical Machinery	13.9	20.0	6.5	7.5	15.1	1.9
Non-Electrical Machinery	15.9	2.8	9.2	9.3	(1.4)	4.5
Chemicals	23.7	10.9	12.0	16.7	6.4	7.2
Autos, Trucks & Parts	0.7	16.5	5.0	(5.1)	11.8	0.4
Instruments	9.8	11.8	12.9	3.6	7.3	8.0
Petroleum	11.9	(1.6)	2.3	5.5	(5.6)	(2.0)
Rubber & Plastic	29.8	67.9	13.4	22.2	61.1	8.5
Food & Beverage	4.6	6.0	10.3	(1.4)	1.9	5.4
Paper & Pulp	12.4	(15.0)	5.3	6.0	(18.2)	0.4
Fabricated Metals	(10.5)	11.6	12.7	(15.6)	6.9	7.8
Iron & Steel	17.5	(11.4)	(4.0)	11.3	(15.0)	(8.1)
Stone, Clay & Glass	1.1	12.4	2.1	(4.7)	8.1	(2.5)
Nonferrous Metals	(6.9)	(5.5)	14.0	(12.3)	(11.8)	9.2
Textiles	4.0	10.1	4.9	(3.1)	6.5	0.0
Other Manufacturing	(2.0)	13.6	5.5	(7.5)	8.9	0.9

Source: McGraw-Hill Publications Company.
a McGraw-Hill data, based on 1982 preliminary figures from the National Science Foundation, plus estimates from the McGraw-Hill annual spring survey of plans for business R&D spending.
b Based on GNP implicit price deflator, 1972 = 100.
p Preliminary.
E Estimate.

FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT IN AEROSPACE

By Type of Research and Fund Source
Calendar Years 1960-1982[a]
(Millions of Dollars)

YEAR	TOTAL AERO-SPACE	Applied Research and Development Funds			Basic Research Funds		
		TOTAL	Federal Govern-ment Contracts	Company	TOTAL	Federal Govern-ment Contracts	Company
1960	$ 3,514	$ 3,452	$3,118	$ 334	$ 62	$32	$30
1961	3,829	3,789	3,417	372	40	20	20
1962	4,042	3,987	3,558	429	55	30	25
1963	4,712	4,653	4,229	424	59	31	28
1964	5,078	5,010	4,585	424	68	35	33
1965	5,148	5,074	4,457	617	74	42	32
1966	5,526	5,452	4,685	767	74	39	35
1967	5,669	5,596	4,497	1,099	73	34	39
1968	5,765	5,695[E]	4,508	1,185	70	25	45
1969	5,882	5,817[E]	4,500	1,313	65	23	42
1970	5,219	5,156	3,985	1,170	63	20	43
1971	4,881	4,831	3,848	983	50	16	34
1972	4,950	4,888[E]	3,949	939[E]	62	21	41
1973	5,052	4,994[E]	3,879[E]	1,115[E]	58	20	38
1974	5,278	5,221	3,982[E]	1,239[E]	57	18	39
1975	5,713	5,659	4,410[E]	1,249[E]	54	18	36
1976	6,339	6,285	4,899[E]	1,386[E]	54	22[E]	32[E]
1977	7,033	6,978	5,464[E]	1,514[E]	55	22[E]	33[E]
1978	7,536	NA	NA	NA	NA	NA	NA
1979	8,041	7,953	5,795[E]	2,158[E]	88	45[E]	43[E]
1980	9,198	NA	NA	NA	NA	NA	NA
1981	11,968	11,840[E]	8,468[E]	3,372[E]	128[r]	60[E]	68[E]
1982[a]	14,045	NA	NA	NA	NA	NA	NA

Source: National Science Foundation.
NOTE: Detail may not add to totals because of rounding.
a Latest year available.
E Estimated by AIA.
NA Not available; details on sources and application of funds available only for odd-numbered years.
r Revised.

RESEARCH AND DEVELOPMENT FUNDS AS PERCENT OF NET SALES ALL MANUFACTURING INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1968-1982

Year	All Manufacturing Industries[a]		Aerospace Industry[b]	
	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales
1968	4.0%	2.1%	19.0%	4.1%
1969	4.0	2.2	20.2	4.6
1970	3.7	2.2	16.2	3.8
1971	3.5	2.1	16.2	3.4
1972	3.4	2.0	16.6	3.3
1973	3.3	2.0	13.3	3.0
1974	3.1	2.0	14.1	3.5
1975	3.1	2.0	12.7	2.8
1976	3.1	2.0	12.7	2.8
1977	2.9	2.0	13.3	2.9
1978	2.9	2.0	13.3	3.2
1979	2.6	1.9	12.9	3.5
1980	3.0	2.1	13.7	3.8
1981	3.1	2.2	16.0	4.6
1982	3.7	2.5	18.3	5.1

Source: National Science Foundation.
a Includes all manufacturing industries known to conduct or finance research and development.
b Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

FUNDS FOR ENERGY RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1979-1983
(Millions of Dollars)

	1979	1980	1981[r]	1982[r]	1983[E]
All Industries[a]—TOTAL	$3,795	$4,162	$4,216	$4,334	$4,535
Federal Funds	1,497	1,563	1,536	1,487	NA
Company Funds	2,298	2,599	2,680	2,847	NA
Aerospace Industry[b]—TOTAL	$ 372	$ 446	$ 412	$ 352	$ 357
Federal Funds	259	283	288	266	NA
Company Funds	113	163	124	86	NA

Source: National Science Foundation.
a Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.
b Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.
NA Not available.
E Estimated by surveyed companies.
r Revised.

FEDERAL AERONAUTICS RESEARCH AND DEVELOPMENT

Budget Authority
Fiscal Years 1969-1984
(Millions of Dollars)

Year	TOTAL	NASA[a]	DOD[b]	DOT[c]
1969	$1,300	$169	$1,161	$(30)[d]
1970	1,882	199	1,641	42
1971	1,990	210	1,707	73
1972	2,295	236	1,964	95
1973	2,187	313	1,799	75
1974	2,030	278	1,678	74
1975	2,015	314	1,627	74
1976	2,351	325	1,941	85
Tr. Qtr.	584	83	480	22
1977	2,727	378	2,256	93
1978	3,338	437	2,807	94
1979	2,850	519	2,240	91
1980	2,991	560	2,336	95
1981	3,286	526	2,653	106
1982	3,581	516	2,984	81
1983[E]	4,338	553	3,664	121
1984[E]	4,954	589	4,079	286

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Latest available data, based on proposed FY 1984 Federal budget.
a Research and Development, Construction of Facilities, Research and Program Management.
b Research, Development, Testing and Evaluation of aircraft and related equipment.
c Federal Aviation Administration Research, Engineering and Development, and Facilities, Engineering and Development.
d Unobligated balances for SST research and development, rescinded in 1969.
E Estimate.

FEDERAL OUTLAYS FOR CONDUCT OF RESEARCH AND DEVELOPMENT

Fiscal Years 1971-1985
(Millions of Dollars)

Year	TOTAL	DOD	NASA	Energy[a]	Other
CURRENT DOLLARS					
1971	$15,050	$ 7,541	$3,382	$1,303	$2,824
1972	16,629	8,275	3,422	1,552	3,380
1973	17,407	8,574	3,315	1,623	3,895
1974	18,239	8,956	3,256	1,825	4,202
1975	19,525	9,341	3,266	2,277	4,641
1976	20,233	9,329	3,521	2,225	5,158
1977	22,462	10,176	3,763	3,181	5,342
1978	24,532	10,726	3,833	3,925	6,048
1979	26,578	11,454	4,064	4,413	6,648
1980	30,351	13,451	4,711	4,698	7,492
1981	34,252	15,720	5,279	5,121	8,132
1982	34,509	18,201	3,220	4,974	8,114
1983	36,560	21,057	2,538	4,771	8,193
1984[E]	42,686	25,310	3,462	4,853	9,062
1985[E]	48,712	31,053	3,314	4,744	9,601
CONSTANT DOLLARS (1972 = 100)[b]					
1971	$15,739	$ 7,886	$3,537	$1,363	$2,953
1972	16,629	8,275	3,422	1,552	3,380
1973	16,665	8,209	3,174	1,554	3,729
1974	16,276	7,992	2,906	1,629	3,750
1975	15,839	7,578	2,649	1,847	3,765
1976	15,341	7,073	2,670	1,687	3,911
1977	15,957	7,229	2,673	2,260	3,795
1978	16,319	7,135	2,550	2,611	4,023
1979	16,260	7,007	2,486	2,700	4,067
1980	17,087	7,572	2,652	2,645	4,218
1981	17,566	8,062	2,707	2,626	4,170
1982	16,528	8,717	1,542	2,382	3,886
1983	16,791	9,671	1,166	2,191	3,763
1984[E]	18,820	11,159	1,526	2,140	3,995
1985[E]	20,483	13,057	1,393	1,995	4,037

Source: "The Budget of the United States Government," (Annually).
NOTE: Detail may not add to totals because of rounding.
a Energy research and development programs transferred from AEC to ERDA with 1974 reorganization and to Dept. of Energy in 1977.
b Based on Fiscal Year GNP implicit price deflator.
E Estimate.

DEPARTMENT OF DEFENSE APPROPRIATIONS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1983-1985
(Millions of Dollars)

	1983	1984[E]	1985[E]
TOTAL—APPROPRIATIONS FOR RDT&E	$22,825	$26,868	$33,985
BY APPROPRIATION			
Army	3,895	4,259	4,987
Navy	6,100	7,572	9,826
Air Force	10,621	12,221	14,402
Defense Agencies	2,153	2,767	4,708
Director of Test & Evaluation, Defense	55	49	62
BY RESEARCH CATEGORIES			
Research	787	840	900
Exploratory Development	2,451	2,202	2,327
Advanced Development	3,824	5,948	7,693
Engineering Development	8,628	9,203	12,010
Management and Support	2,243	2,333	2,515
Operational Systems Development	4,892	6,342	8,540
RECAP OF BUDGET ACTIVITIES			
Technology Base	3,238	3,042	3,226
Advanced Technology Development	823	1,386	3,421
Strategic Programs	5,825	7,843	8,735
Tactical Programs	7,255	7,909	10,510
Intelligence and Communications	2,709	3,404	4,216
Defensewide Mission Support	2,975	3,284	3,877
RECAP OF FYDP PROGRAMS			
Strategic Forces	774	736	872
General Purpose Forces	1,175	1,432	2,077
Intelligence and Communications	2,911	4,092	5,296
Airlift/Sealift	10	11	33
Research and Development (FYDP Program 6)	17,933	20,526	25,445
Central Supply and Maintenance	17	64	251
Training, Medical and Other	—	3	7
Support of Other Nations	5	5	4

Source: Department of Defense Budget (Annually).
NOTE Detail may not add to totals because of rounding.
E Estimate.

DEPARTMENT OF DEFENSE
OUTLAYS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1970-1985
(Millions of Dollars)

Year	TOTAL, All RDT&E Functions	Air Force	Navy	Army	Other
1970	$ 7,166	$ 2,937	$2,084	$1,665	$ 480
1971	7,303	2,809	2,405	1,569	520
1972	7,881	3,205	2,427	1,779	470
1973	8,157	3,362	2,404	1,912	479
1974	8,582	3,240	2,623	2,190	529
1975	8,866	3,308	3,021	1,964	573
1976	8,923	3,338	3,215	1,842	528
Tr. Qtr.	2,203	830	778	437	161
1977	9,795	3,618	3,481	2,069	627
1978	10,508	3,626	3,825	2,342	715
1979	11,152	4,080	3,826	2,409	837
1980	13,127	5,017	4,382	2,707	1,021
1981	15,278	6,341	4,783	2,958	1,196
1982	17,729	7,794	5,240	3,230	1,465
1983	20,554	9,182	5,854	3,658	1,861
1984[E]	25,157	11,843	6,815	4,031	2,468
1985[E]	30,458	13,578	8,620	4,579	3,680

Source: Department of Defense Budget (Annually).
E Estimate.

DEPARTMENT OF DEFENSE
PRIME CONTRACT AWARDS[a]
FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1979-1983
(Millions of Dollars)

Program Categories	1979	1980	1981	1982	1983
TOTAL—RDT&E	$8,545	$9,470	$10,483	$14,882	$16,301
Research	382	648	694	685	763
Exploratory Development	726	868	1,081	1,285	1,261
Other Development	6,327	6,920	8,233	12,537	13,915
Management & Support	1,110	1,034	474	375	362
Aircraft—TOTAL	$1,315	$1,171	$ 739	$ 2,906	$ 2,072
Research	8	3	4	14	36
Exploratory Development	25	39	58	139	152
Other Development	1,268	1,126	672	2,740	1,879
Management & Support	13	3	6	13	6
Missile and Space Systems—TOTAL	3,064	3,363	4,603	5,648	6,444
Research	13	36	27	14	34
Exploratory Development	137	173	277	322	239
Other Development	2,530	2,800	4,184	5,265	6,097
Management & Support	384	354	115	48	73
Electronics & Communications Equipment—TOTAL	1,893	2,417	2,582	3,534	4,681
Research	56	67	74	77	76
Exploratory Development	226	260	305	351	404
Other Development	1,499	1,977	2,110	3,049	4,127
Management & Support	112	113	93	57	75
All Other—TOTAL[b]	2,271	2,519	2,558	2,794	3,104
Research	304	542	589	581	617
Exploratory Development	338	396	441	473	466
Other Development	1,029	1,017	1,268	1,482	1,812
Management & Support	600	564	260	257	208

Source: Department of Defense, "Prime Contract Awards by Service Category and Federal Supply Classification" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Effective FY 1980, data include DOD contract awards for civil functions; data for prior years limited to military prime contract awards.
b "All Other" includes ships, tank-automative, weapons, ammunition, services, and other.

DEPARTMENT OF DEFENSE
PRIME CONTRACT AWARDS OVER $25,000[a]
FOR RESEARCH, DEVELOPMENT, TEST & EVALUATION

By Region and Type of Contractor
Fiscal Year 1983

REGION	TOTAL	Type of Contractor		
		Educational Institutions	Other Non-Profit Institutions[a]	Business Firms
TOTAL—Millions of Dollars	$16,199	$941	$807	$14,451
New England	1,808	278	301	1,229
Middle Atlantic	1,751	78	19	1,655
East North Central	507	57	34	417
West North Central	991	8	2	980
South Atlantic	2,014	319	94	1,601
East South Central	219	7	4	209
West South Central	638	31	15	592
Mountain	1,061	54	3	1,005
Pacific[b]	7,209	110	336	6,762
PERCENT OF TOTAL	100.0%	100.0%	100.0%	100.0%
New England	11.2	29.5	37.3	8.5
Middle Atlantic	10.8	8.2	2.3	11.5
East North Central	3.1	6.0	4.2	2.9
West North Central	6.1	0.9	0.2	6.8
South Atlantic	12.4	33.9	11.7	11.1
East South Central	1.4	0.7	0.5	1.4
West South Central	3.9	3.3	1.8	4.1
Mountain	6.6	5.7	0.3	7.0
Pacific[b]	44.5	11.7	41.7	46.8

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Includes contracts with other government agencies.
b Includes Alaska and Hawaii.

MISSILE PROGRAMS
RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1983, 1984 and 1985
(Millions of Dollars)

Agency, Type and Model	1983	1984[E]	1985[E]
AIR FORCE			
ALCM	$ 19.3	$ 38.2	$ 28.0
AMRAAM[b]	207.0	186.7	217.7
*ASMS	49.7	74.3	108.3
GLCM	28.3	36.2	18.7
IIR Maverick	7.7	4.5	—
Peacekeeper (M-X)	1,912.6	1,984.9	1,716.3
NAVY			
Harm[b]	$ 37.5	$ 12.6	$ 23.3
Laser Maverick	1.0	1.9	2.0
Phoenix	22.8	2.8	—
RAM	16.2	4.2	6.5
Sparrow	—	—	3.9
Standard	51.2	31.4	19.5
Tomahawk	109.0	128.8	81.5
Trident I	14.7	23.3	—
Trident II	351.0	1,452.7	2,077.5
ARMY			
Laser Hellfire[c]	$ 25.3	$ 3.2	$ 2.9
MLRS	26.1	1.0	1.9
Patriot	45.4	83.0	61.5
Pershing II	111.6	17.7	—
Stinger	—	—	13.9
TOW 2	2.2	1.9	9.9
*Ballistic Missile Defense Advanced Technology Program	142.8	152.9	—(e)
*Ballistic Missile Defense Systems Technology Program (BMDSTP)	376.2	316.3	1.5(e)
*Joint Tactical Missile System (JTACMS)[d]	30.8	60.0	114.5
Remotely Piloted Vehicles (RPVs)	81.7	132.6	103.1
Air Defense Targets	—	—	1.0

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE: See Missile Programs Chapter for missile program procurement authorization data.
E Estimate.
a Total Obligational Authority.
b Navy and Air Force funding.
c Army and Navy funding.
d Army and Air Force funding.
e Funds transferred to DoD Strategic Defense Initiatives in FY1985.
* Programs in R&D only.

MILITARY AIRCRAFT PROGRAMS
RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1983, 1984 and 1985
(Millions of Dollars)

Agency, Type and Model	1983	1984[E]	1985[E]
AIR FORCE			
A-10 A/B Thunderbolt II	$ 6.0	$ 2.6	$ 4.1
B-1B	753.5	737.2	508.3
B-52H Cruise Missile Carrier A/c Modif. (Int.)	63.6	63.2	77.3
B-52 G/H Avionics Modernization	13.7	2.6	—
C-5A Wing Modification	6.3	1.5	—
E-3A (AWACS)	67.0	63.4	76.6
European Distrib. System Aircraft (EDSA)	2.6	—	—
EF-111A Modification	18.6	16.1	13.0
F-15 A/B/C/D Eagle	115.2	107.6	82.9
F-16 A/B Multimission Fighter Falcon	71.9	104.4	83.4
KC-135 Re-engining/Modernization	27.2	9.2	4.0
LANTIRN (Night Precision Attack)	99.9	58.1	98.3
Precision Location Strike System (PLSS)	78.7	69.0	83.0
Tactical Fighter Derivative Aircraft	—	19.3	147.0
T-34A Next Generation Trainer	52.0	122.3	78.0
*Advanced Tactical Fighter[b]	20.0	34.7	94.3
*Aircraft Engine Component Improvement Program[b]	107.3	125.2	149.8
Range Control Aircraft	—	1.5	0.8
NAVY			
A-6E Intruder	$ 4.7	$ 8.5	$ 17.9
AV-8B	117.8	101.9	70.4
CH-53E Super Stallion	15.1	32.3	14.6
E-2C Hawkeye	52.1	53.3	39.1
EA-6B Prowler	12.7	23.4	44.1
F-14A Tomcat	6.9	4.4	15.2
F/A-18 Hornet	107.8	16.7	19.8
P-3C Orion	18.6	9.2	37.4
SH-2F Seasprite (LAMPS MK-I)	5.7	—	—
SH-60B Seahawk LAMPS	9.0	2.1	—
AH-1T Sea Cobra	3.0	10.9	1.2
E-6A (ECX)	37.2	70.1	74.1
FEWSG	3.7	4.8	4.5
*VTX (TS)	7.9	24.9	113.4
*F-14 Upgrade (F-14D)	14.7	40.6	286.7
*CV Innerzone ASW HELO	—	—	44.5
*Joint Services Adv. Vert. Lift A/c (JVX)[c]	4.9	86.7	198.5
ARMY			
OH-58D AHIP	$ 73.8	$ 52.7	$ 24.5
AH-64 Attack Helicopter	33.6	27.8	16.8
UH-60A Blackhawk	8.4	15.0	—
*ARTI/LHX	—	26.2	48.6

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE: See Aircraft Production Chapter for aircraft program procurement authorization data.
a Total Obligational Authority.
b Air Force and Navy.
c Air Force, Navy and Marine Corps.
E Estimate.
* Programs in R&D only.

foreign trade

In 1983, the United States experienced an international trade deficit of $60.7 billion, an all-time high and the eighth consecutive annual deficit.

In contrast, the aerospace industry recorded a strong positive trade performance, with exports of $16.1 billion and a trade balance of $12.6 billion. Both figures fell short of the record levels of 1981, but they were higher than any other year in history.

The 1983 aerospace trade balance was compounded of a moderate (3 percent) increase in export sales and a sharp drop in imports (more than 24 percent). The $12.6 billion trade balance compares with $11 billion in 1982 and $13.1 billion in the record year 1981.

The composition of the aerospace export volume represented a turnaround from the previous year's experience. In 1982, the industry suffered a sharp drop in exports due to low levels of civil aircraft sales, particularly airline transports; the civil export drop was partially offset by record levels of military exports. In 1983, the reverse was true: civil exports increased by almost $1 billion while military exports fell off by more than half a billion dollars. The net result was a total export gain over the previous year of $462 million.

In 1983, aerospace exports amounted to 8.2 percent of total U.S. exports; this compares with 7.5 percent for the previous year and an average of 7.2 percent for the five year span 1978-82. The 1983 export volume ($16.1 billion) included military exports of $5.5 billion and civil exports totaling $10.6 billion.

Foreign deliveries of transport aircraft accounted for the greatest dollar value among civil exports, even though transport sales were depressed in comparison with the high levels of 1980-81. The industry delivered 129 commercial transports worth $4.7 billion; the figure compares 121 deliveries worth $3.8 billion in 1982.

Exports of general aviation aircraft, in decline for several years, fell off again in 1983. In terms of dollar value, sales dropped from $517 million in 1982 to $356 million in 1983; in numbers, deliveries declined from 940 to 519. Exports of civil helicopters increased in dollar value (up $26 million to $232 million), but the number of units delivered was down by 38 to 216.

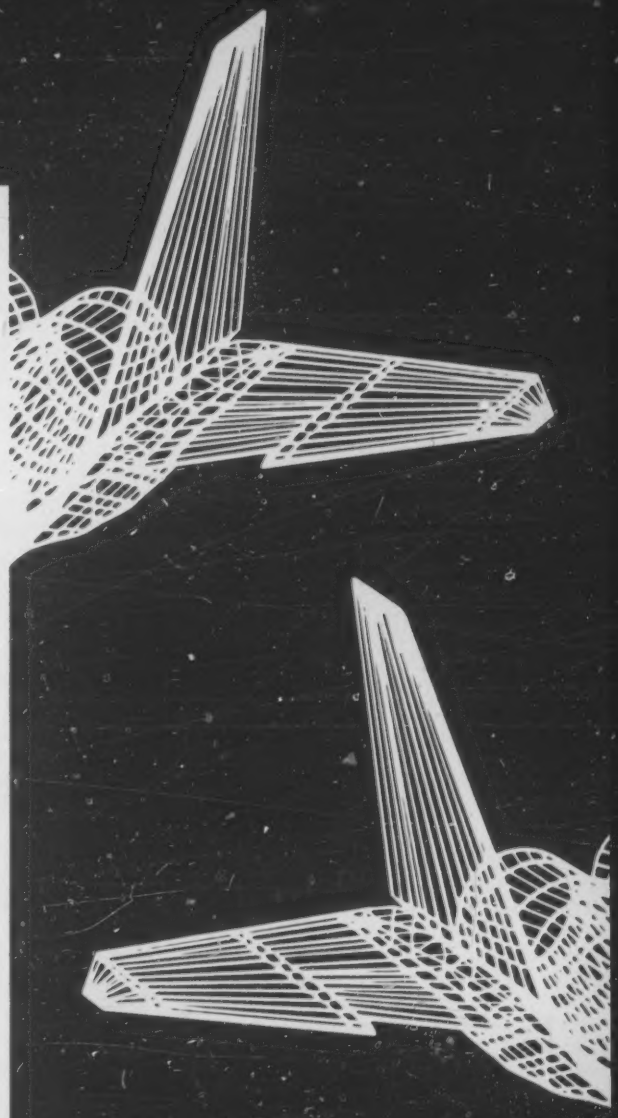
Among other categories of civil aerospace exports, sales of aircraft engines—at $950 million—were up $187 million over 1982, and exports of aircraft and engine parts dropped $43 million to $3.95 billion.

The military export volume was made up of $1.8 billion in deliveries of complete aircraft, down from $2.4 billion in 1982; $172 million in aircraft engines (up $32 million); $2.5 billion in aircraft and engine parts (up $118 million); and $994 million in guided missiles, rockets and parts (down $132 million). As is usually the case, the largest element of complete aircraft exports was the fighter/fighter-bomber category. The industry delivered 93 such aircraft valued at $1.4 billion; the comparable figures

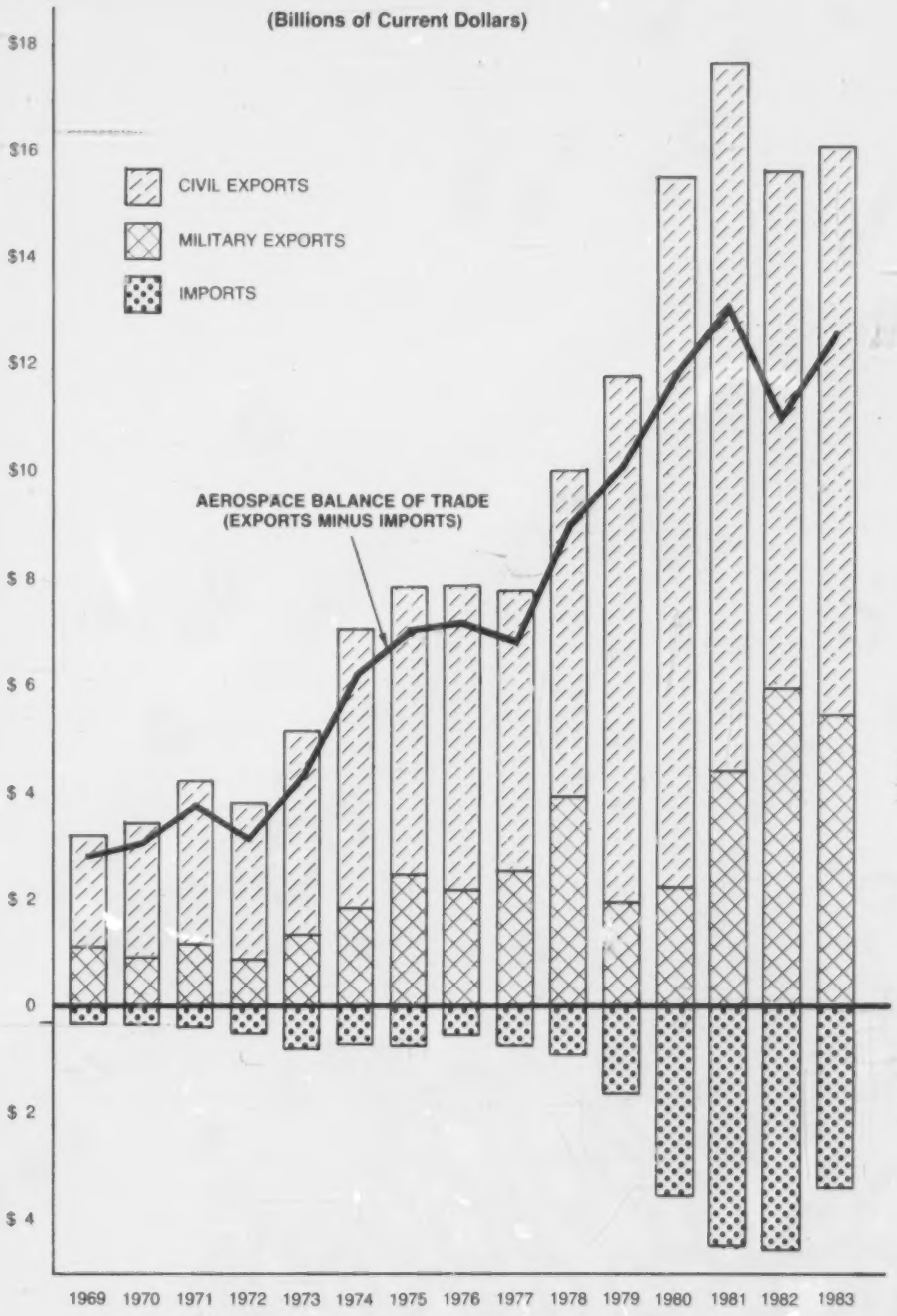
for 1982 were 154 fighters/fighter-bombers worth $1.5 billion. Total military aircraft delivered to foreign customers numbered 936, statistically an increase of almost 300 units over 1982, but this was an anomaly; it was due to sales in very large numbers of used or rebuilt aircraft whose combined dollar value represented only a very small portion of the total.

Aerospace imports dropped considerably below the record $4.6 billion of 1982, but nonetheless remained at a relatively high level of $3.4 billion. Foreign deliveries to U.S. customers of aircraft engines and parts accounted for $1.1 billion, down from $1.3 billion in 1982. Imports of complete aircraft amounted to $899 million, virtually all of them in the civil aircraft category; the figure compares with $1.3 billion in 1982. By far the largest category, in dollar value terms, was imports of general aviation aircraft; however, at $542 million, this category showed a substantial reduction from the $838 million worth of general aviation planes imported in 1982. In terms of numbers, the U.S. imported 162 general aviation aircraft, down from 274 in the previous year. Imports of civil helicopters (100) were numerically well below the 1982 level (184) but slightly higher in dollar terms; the value of 1983 helicopter imports was $89 million, up from $85 million in 1982.

In dollar terms, the leading nation in sales of general aviation aircraft to U.S. customers was Canada ($208 million), followed by the United Kingdom ($137 million), France ($104 million) and Israel ($32 million). France led in civil helicopter sales to U.S. customers ($40 million) with Germany ($36 million) second.



AEROSPACE EXPORTS, IMPORTS, AND TRADE BALANCE



Source: Aerospace Industries Association

TOTAL AND AEROSPACE BALANCE OF TRADE

Calendar Years 1960-1983
(Millions of Dollars)

Year	TOTAL U.S. Trade Balance[a]	Aerospace			Aerospace Trade Balance as Percent of U.S. Total
		Trade Balance	Exports	Imports	
1960	$ 5,369	$ 1,665	$ 1,726	$ 61	31.0%
1961	6,096	1,501	1,653	152	24.6
1962	4,180	1,795	1,923	128	42.9
1963	6,061	1,532	1,627	95	25.3
1964	7,555	1,518	1,608	90	20.1
1965	5,875	1,459	1,618	159	24.8
1966	4,524	1,370	1,673	303	30.3
1967	4,409	1,961	2,248	287	44.5
1968	1,133	2,661	2,994	333	234.9
1969	1,599	2,831	3,138	307	177.0
1970	2,834	3,097	3,405	308	109.3
1971	(2,024)[b]	3,830	4,203	373	(c)
1972	(6,351)	3,230	3,795	565	(c)
1973	1,222	4,360	5,142	782	356.8
1974	(2,996)	6,350	7,095	745	(c)
1975	9,630	7,045	7,792	747	73.2
1976	(7,786)	7,267	7,843	576	(c)
1977	(28,970)	6,850	7,581	731	(c)
1978	(33,541)	9,058	10,001	943	(c)
1979	(30,272)	10,123	11,747	1,624	(c)
1980	(27,336)	11,952	15,506	3,554	(c)
1981	(30,051)	13,134	17,634	4,500	(c)
1982	(35,182)	11,035[r]	15,603	4,568[r]	(c)
1983	(60,710)	12,619	16,065	3,446	(c)

Source: Bureau of the Census, "Highlights of U.S. Export and Import Trade," Report FT990 (Monthly); "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually); "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

a U.S. Balance of Trade is the difference between exports of domestic merchandise, including Department of Defense shipments, and imports for consumption (customs value basis).

b First negative U.S. Balance of Trade since 1888.

c Not applicable.

r Revised.

U.S. IMPORTS OF AEROSPACE PRODUCTS

Calendar Years 1979-1983
(Millions of Dollars)

	1979	1980	1981	1982	1983
TOTAL	$1,624.3	$3,553.6	$4,500.4	$4,568.0r	$3,445.7
TOTAL AIRCRAFT	512.1	975.1	1,379.7	1,296.9r	898.9
Civil Aircraft—TOTAL	508.6	969.1	1,336.2	1,266.0r	892.2
Transports	199.8	285.5	195.5	231.4r	188.0
General Aviation[a]	260.4	495.8	913.0	837.7	541.9
Helicopters	21.6	53.9	105.4	84.9	89.5
Used or Rebuilt	26.8	133.9	122.3	112.0	72.8
Military Aircraft	1.5	4.0	41.4	27.9	2.7
Gliders, Balloons & Airships	2.0	2.0	2.1	3.0	4.0
Civil	NA	1.8	1.9	2.9	3.8
Military	NA	0.2	0.2	0.1	0.2
TOTAL AIRCRAFT ENGINES & PARTS	547.0	1,097.4	1,465.0	1,318.5	1,130.1
Piston, Civil	4.0	11.0	5.1	10.4	14.5
Pist. Engs. & Parts, Mil.		1.1	0.1	0.4	1.0
Piston Engine Parts, Civil		8.3	7.2	4.2	5.3
Turbine, Civil	324.2	720.3	1,040.6	787.0	602.4
Turbine, Military		27.5	7.6	15.6	2.7
Turbine Engine Parts, Civil	218.8	295.1	354.4	454.3	451.8
Turbine Engine Parts, Military		34.1	50.0	46.6	52.4
TOTAL OTHER	565.2	1,481.1	1,655.7	1,952.6	1,416.7
Aircraft Parts, Civil	NA	198.5	229.6	301.3	266.7
Non-Specified Parts, Civil	564.5	679.1	714.2	720.2	660.3
Aircraft Parts, Military		121.4	426.8	574.7	441.9
Other Parts, Military		136.8	64.8	26.0	18.0
Aircraft, Engs., & Parts Previously Exported from U.S.	NA	345.2	220.0	330.2	29.5
Other	0.7	0.1	0.3	0.2	0.3

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

NOTE: Import classifications were revised as of 1980 data, with the total number of categories increased, and most former categories divided into military and civil items. Also effective 1980, import data include two new commodity groupings: civil aircraft parts, and aerospace products previously exported from the U.S.

a All fixed-wing aircraft under 33,000 pounds.

NA Not available.

r Revised. Four Airbus A-300's, imported during December 1982 with a total value of $137,741,067 but reported by the Bureau of the Census in January 1983 data, have been deleted from 1983 data and added to 1982 data.

U.S. IMPORTS OF COMPLETE AIRCRAFT

Calendar Years 1979-1983

	1979	1980	1981	1982	1983
TOTAL NUMBER OF AIRCRAFT	633[a]	676	882	872[a]	693
Civil Aircraft	392[a]	580	733	652[a]	450
Heilcopters	90[a]	177	213	184	100
Single-Engine	3	6	9	23	6
Multi-Engine Under 4400 lbs	5	6	2	13	18
Multi-Engine 4400-10,000 lbs	86	119	123	87	52
Multi-Engine 10,000-33,000 lbs	102	156	218	151	86
Multi-Engine Over 33,000 lbs	9	16	8	8[a]	7
Used or Rebuilt	97	100	160	186	181
Military Aircraft	121	23	25	17	7
Gliders	120	73	124	203	236
Balloons & Airships	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$512.1	$975.1	$1,379.7	$1,296.9[a]	$898.9
Civil Aircraft	508.6	969.1	1,336.2	1,266.0[a]	892.2
Helicopters	21.6	53.9	105.4	84.9	89.5
Single-Engine	(*b*)	0.3	0.8	2.0	0.4
Multi-Engine Under 4400 lbs	0.4	1.2	0.1	1.7	2.5
Multi-Engine 4400-10,000 lbs	37.2	95.2	123.7	104.3	72.6
Multi-Engine 10,000-33,000 lbs	222.8	399.1	788.4	729.7	466.4
Multi-Engine Over 33,000 lbs	199.8	285.5	195.5	231.4[a]	188.0
Used or Rebuilt	26.8	133.9	122.3	112.0	72.8
Military Aircraft	1.5	4.0	41.4	27.9	2.7
Gliders	1.6	1.5	1.6	2.6	3.7
Balloons & Airships	0.4	0.5	0.5	0.4	0.3

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

NA Not available.

a Revised. Four Airbus A-300's, imported during December 1982 with a total value of $137,741,067 but reported by the Bureau of the Census in January 1983 data, have been deleted from 1983 data and added to 1982 data.

b Less than $50,000.

r Revised.

U.S. EXPORTS AND EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1960-1983
(Millions of Dollars)

Year	TOTAL Exports[a] of U.S. Merchandise	Exports of Aerospace Products				
		TOTAL	Percent of Total U.S. Exports	Civil		Military
				Trans-ports	Other	
1960	$ 20,375	$ 1,726	8.5%	$ 480	$ 609	$ 637
1961	20,754	1,653	8.0	263	615	775
1962	20,431	1,923	9.4	259	651	1,013
1963	23,062	1,627	7.1	191	541	895
1964	26,156	1,608	6.1	211	553	844
1965	27,127	1,618	6.0	353	501	764
1966	29,884	1,673	5.0	421	614	638
1967	31,142	2,248	7.2	611	769	868
1968	34,199	2,994	8.8	1,200	1,089	705
1969	37,462	3,138	8.4	947	1,080	1,111
1970	42,590	3,405	8.0	1,283	1,233	889
1971	43,492	4,203	9.7	1,567	1,513	1,123
1972	48,959	3,795	7.8	1,119	1,835	841
1973	70,246	5,142	7.3	1,664	2,124	1,354
1974	97,144	7,095	7.3	2,655	2,618	1,822
1975	106,561	7,792	7.3	2,397	2,927	2,468
1976	113,666	7,843	6.9	2,468	3,209	2,166
1977	119,006	7,581	6.4	1,936	3,113	2,532
1978	141,228	10,001	7.1	2,558	3,460	3,983
1979	178,798	11,747	6.6	4,998	4,774	1,975
1980	216,672	15,506	7.2	6,727	6,521	2,258
1981	228,961	17,634	7.7	7,180	6,132	4,322
1982	207,158	15,603	7.5	3,834	5,774	5,995
1983	195,969	16,065	8.2	4,683	5,912	5,470

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT 446 (Annually); "Highlights of U.S. Export and Import Trade," Report FT 990 (Monthly).

a Exports of domestic merchandise including DOD shipments.

r Revised.

EXPORTS OF U.S. AEROSPACE PRODUCTS

Calendar Years 1979-1983
(Millions of Dollars)

	1979	1980	1981	1982	1983
TOTAL	$11,747	$15,506	$17,634	$15,603	$16,065
TOTAL CIVIL	$ 9,772	$13,248	$13,312	$ 9,608	$10,595
Complete Aircraft—TOTAL	6,177	8,256	8,613	4,848	5,691
Transports	4,998	6,727	7,180	3,834	4,683
General Aviation[a]	650	739	790	517	356
Helicopters	207	299	346	206	232
Other, Including Used	322	491	297	291	420
Aircraft Engines—TOTAL	375	556	784	763	950
Jet & Gas Turbines	323	514	739	721	914
Piston	52	42	45	42	36
Aircraft & Eng. Parts Incl. Spares—TOTAL	3,220	4,436	3,915	3,997	3,954
Aircraft Parts & Accessories	2,412	3,296	2,960	2,857	2,742
Aircraft Engine Parts	808	1,140	955	1,140	1,212
TOTAL MILITARY	$ 1,975	$ 2,258	$ 4,322	$ 5,995	$ 5,470
Complete Aircraft—TOTAL[b]	838	949	1,712	2,388	1,845
Fighters & Fighter Bombers	494	449	1,006	1,473	1,379
Transports	162	231	158	341	112
Helicopters	61	88	177	156	62
Other, Including Used	121	181	371	418	292
Aircraft Engines—TOTAL	67	63	83	140	172
Jet & Gas Turbines	61	58	78	136	162
Piston	6	5	5	4	10
Aircraft & Eng. Parts Incl. Spares—TOTAL	467	497	1,971	2,341	2,459
Aircraft Parts & Accessories	326	369	1,475	1,845	2,058
Aircraft Engine Parts	141	128	496	496	401
Guided Missiles, Rockets, & Parts—TOTAL	603	749	556	1,126	994
Guided Missiles & Rockets	292	327	213	716	443
Missile & Rocket Parts	279	393	313	378	499
Missile & Rocket Engines	7	13	4	8	28
Missile & Rocket Engine Parts	25	16	26	24	24

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT 446 (Annually).
a All fixed-wing aircraft under 33,000 pounds.
b Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

EXPORTS OF CIVIL AIRCRAFT

Calendar Years 1979-1983

	1979	1980	1981	1982	1983
TOTAL NUMBER OF AIRCRAFT	5,115	4,434	3,826	1,557	1,088
Helicopters, Under 2200 lbs	294	335	268	162	141
Helicopters, Over 2200 lbs	165	190	185	92	75
Single-Engine Aircraft	2,821	2,172	1,800	539	279
Multi-Engine Aircraft, Under 4400 lbs	645	546	371	167	106
Multi-Engine Aircraft, 4400-10,000 lbs	360	432	426	209	112
Multi-Engine Aircraft, 10,000-33,000 lbs	52	28	20	25	22
Passenger Aircraft, Over 33,000 lbs	172	215	236	110	122
Cargo Aircraft, Over 33,000 lbs	13	8	7	6	2
Other Aircraft, Over 33,000 lbs	15	14	12	5	5
Other Aircraft, Including Balloons, Gliders & Kites	NA	NA	NA	NA	NA
Used or Rebuilt Aircraft	578	494	501	242	224
TOTAL VALUE (Millions of Dollars)	$6,177	$8,256	$8,613	$4,848	$5,691
Helicopters, Under 2200 lbs	61	82	71	45	35
Helicopters, Over 2200 lbs	146	217	275	161	197
Single-Engine Aircraft	124	114	105	36	23
Multi-Engine Aircraft, Under 4400 lbs	94	88	72	35	21
Multi-Engine Aircraft, 4400-10,000 lbs	306	454	526	309	155
Multi-Engine Aircraft, 10,000-33,000 lbs	126	83	87	137	157
Passenger Aircraft, Over 33,000 lbs	4,128	5,511	6,087	3,310	4,415
Cargo Aircraft, Over 33,000 lbs	322	480	363	216	37
Other Aircraft, Over 33,000 lbs	548	736	730	308	231
Other Aircraft, Including Balloons, Gliders & Kites	11	5	62	73	122
Used or Rebuilt Aircraft	311	486	235	218	298

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NA Not available.

EXPORTS OF CIVIL HELICOPTERS

Calendar Years 1979-1983

Region of Destination	1979	1980	1981	1982	1983
TOTAL NUMBER EXPORTED ...	459	525	453	254	216
Canada & Greenland	85	91	78	17	16
Latin America & Caribbean	89	143	140	63	38
Europe	103	118	71	49	51
Middle East	11	21	21	13	48
Asia	80	57	70	38	44
Oceania	66	72	32	21	8
Africa	25	23	41	53	11
TOTAL VALUE (Millions of Dollars)	$206.8	$298.7	$346.4	$205.9	$232.1
Canada & Greenland	29.4	42.9	40.6	15.2	9.7
Latin America & Caribbean	42.4	78.4	89.5	49.5	47.0
Europe	51.6	79.4	91.8	42.0	50.7
Middle East	11.4	24.9	27.2	12.9	48.6
Asia	45.6	51.3	65.3	50.4	59.2
Oceania	21.1	16.3	19.5	10.6	1.1
Africa	5.3	5.5	12.5	25.3	15.8

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

IMPORTS OF CIVIL HELICOPTERS

Calendar Years 1979-1983

Country of Origin	1979	1980	1981	1982	1983
TOTAL NUMBER IMPORTED	90	177	213	184	100
France	81	167	193	167	46
Germany	5	9	12	15	48
Italy	4	1	8	1	1
United Kingdom	—	—	—	1	5
TOTAL VALUE (Millions of Dollars)	$21.6	$ 53.9	$105.4	$ 84.9	$ 89.5
France	17.3	48.4	92.4	74.2	39.6
Germany	1.3	4.4	6.9	8.9	35.8
Italy	3.0	1.1	6.1	1.1	0.8
United Kingdom	—	—	—	0.7	13.3

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

EXPORTS OF GENERAL AVIATION AIRCRAFT[a]

Calendar Years 1979-1983

Region of Destination	1979	1980	1981	1982	1983
TOTAL NUMBER EXPORTED	3,878	3,178	2,617	940	519
Canada & Greenland	478	414	336	94	43
Latin America & Caribbean	1,557	1,452	1,220	348	204
Europe	988	760	442	226	102
Middle East	38	19	23	32	13
Asia	120	55	57	40	30
Oceania	537	253	301	113	43
Africa	160	225	238	87	84
TOTAL VALUE (Millions of Dollars)	$ 650.5	$ 739.5	$ 789.5	$516.6	$356.0
Canada & Greenland	55.7	49.9	57.7	19.3	13.6
Latin America & Caribbean	221.1	239.5	279.6	166.3	66.0
Europe	219.3	235.0	219.7	178.3	92.9
Middle East	27.4	65.1	30.2	18.6	86.2
Asia	31.5	36.9	39.1	25.3	31.4
Oceania	60.7	52.6	75.8	45.1	16.1
Africa	34.8	60.5	87.4	63.7	49.8

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
a All fixed-wing aircraft under 33,000 pounds.

IMPORTS OF GENERAL AVIATION AIRCRAFT

Calendar Years 1979-1983

Country of Origin	1979	1980	1981	1982	1983
TOTAL NUMBER IMPORTED	196	287	352	274	162
Brazil	5	20	37	24	15
Canada	11	38	51	58	38
France	35	48	59	48	19
Israel	26	33	42	22	9
Japan	69	56	70	52	17
United Kingdom	40	62	67	36	36
Other	10	30	26	34	28
TOTAL VALUE (Millions of Dollars)	$260.4	$495.8	$913.0	$837.7	$541.9
Brazil	5.3	21.7	54.0	40.2	26.9
Canada	20.5	88.2	243.0	306.9	208.4
France	75.3	141.8	248.2	222.6	104.3
Israel	55.6	79.2	123.8	72.9	31.7
Japan	19.9	21.7	34.3	37.7	16.2
United Kingdom	74.2	107.1	183.7	143.9	137.0
Other	9.6	36.1	26.0	13.5	17.4

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

EXPORTS OF COMMERCIAL TRANSPORT AIRCRAFT

33,000 Pounds and Over Airframe Weight
Calendar Years 1979-1983

Region of Destination	1979	1980	1981	1982	1983
TOTAL NUMBER EXPORTED ...	200	237	255	121	129
Canada	20	22	25	13	8
Latin America & Caribbean	19	31	35	13	8
Europe	68	109	108	31	57
Middle East	17	9	21	13	10
Asia	60	53	34	25	30
Oceania	6	7	19	8	4
Africa	10	6	13	18	12
TOTAL VALUE (Millions of Dollars)	$4,998	$6,727	$7,180	$3,834	$4,683
Canada	373	299	584	294	280
Latin America & Caribbean	423	640	1,027	301	304
Europe	1,601	2,670	2,528	938	1,785
Middle East	582	236	841	699	291
Asia	1,722	2,467	1,405	1,096	1,464
Oceania	149	179	559	234	180
Africa	148	236	236	272	379

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

EXPORTS OF MILITARY AIRCRAFT[a]

Calendar Years 1979-1983

	1979	1980	1981	1982	1983
TOTAL NUMBER OF AIRCRAFT .	332	462	508	637	936
Fighters & Fighter Bombers	133	90	113	154	93
Transports	17	23	22	32	15
Helicopters	65	89	68	55	55
New Aircraft, NEC	91	220	156	228	124
Used or Rebuilt Aircraft	26	40	149	168	649
Airships, Balloons, Gliders, etc. ...	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$838	$949	$1,712	$2,388	$1,845
Fighters & Fighter Bombers	494	449	1,006	1,473	1,378
Transports	162	231	158	341	112
Helicopters	61	88	177	156	62
New Aircraft, NEC	96	148	306	361	248
Used or Rebuilt Aircraft	5	2	15	16	22
Airships, Balloons, Gliders, etc. ...	20	31	50	41	23

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NEC Not elsewhere classified.
NA Not available
a Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

EXPORTS OF AIRCRAFT ENGINES

Calendar Years 1981-1983
(Millions of Dollars)

	1981		1982		1983	
	Number	Value	Number	Value	Number	Value
TOTAL	5,014	$867	4,916	$903	3,698	$1,122
Turbine Engines-New	1,259	580	1,491	644	1,104	743
Civil	1,085	515	1,213	517	890	597
Military	174	65	278	127	214	146
Turbine Engines-Used	722	237	646	213	677	333
Civil	644	224	530	204	550	317
Military	78	13	116	9	127	16
Piston Engines	3,033	50	2,779	46	1,917	46
Civil, New, Under 500 HP	1,302	14	1,282	19	776	9
Civil, New, Over 500 HP	171	10	96	6	139	11
Civil, Used	1,308	21	1,150	17	863	16
Military	252	5	251	4	139	10

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

IMPORTS OF TURBINE AIRCRAFT ENGINES[a]

Calendar Years 1981-1983
(Millions of Dollars)

	1981		1982		1983	
	Number	Value	Number	Value	Number	Value
Turbine Engines	3,404	$1,049	1,978	$803	1,448	$605
Civil	3,326	1,041	1,854	787	1,343	602
Military	78	8	124	16	105	3

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

a New and used.

EXPORT-IMPORT BANK LENDING AUTHORITY AND GROSS AUTHORIZATIONS SUMMARY

Fiscal Years 1977-1985
(Millions of Dollars)

LOANS[a]

Year	Lending Authority[c]	Authorizations Summary				
		TOTAL Loans[a]	Directs Credits, CFF, and Relending			Discount Loans
			Total Direct Loans[a]	Direct Credits	CFF[b] & Relending	
1977	$2,490	$1,221	$ 747	$ 700	$ 47	$ 474
1978	3,600	3,425	2,927	2,872	55	497
1979	3,750	4,475	3,825	3,725	100	650
1980	4,001	4,578	4,087	4,045	42	491
1981	5,461	5,431	5,079	5,045	34	352
1982	4,400	3,516	3,104	3,104	(*b*)	412
1983	4,400	845	685	685	(*b*)	160
1984[E]	3,830	NA	NA	NA	(*b*)	NA
1985[E]	3,800	NA	NA	NA	(*b*)	NA

GUARANTEES AND INSURANCE

Year	Lending Authority	Authorizations Summary		
		TOTAL Guarantees and Insurance	Guarantees	Insurance
1977	$ (*d*)	$4,379	$1,021	$3,358
1978	(*d*)	3,951	589	3,362
1979	(*d*)	5,016	908	4,108
1980	(*d*)	8,032	2,510	5,522
1981	8,059	7,423	1,513	5,910
1982	9,220	5,832	727	5,105
1983	9,000	8,525	1,741	6,784
1984[E]	10,000	NA	NA	NA
1985[E]	10,000	NA	NA	NA

Source: Export-Import Bank of the United States.
NOTE: Detail may not add to totals because of rounding.
a Discount Loans excluded from loan lending authority limitation until FY 1981. Comparable authorization data for 1980 and prior years are therefore listed under Total Direct Loans, which include Direct Credits, CFF and Relending Loans. For 1981 and subsequent years, compare TOTAL Loans authorization data with Lending Authority, both of which include Discount Loans. The value of Total Direct Loans may exceed Lending Authority because of the inclusion in Total Direct Loans of the full amount of Certificates of Loan Participation (COLPs), portions of which are subsequently sold to commercial banks.
b CFF (Cooperative Financing Facility) program discontinued after 1981.
c Effective 1981, lending authority includes discount loans as well as direct loans.
d Limitation for Guarantees and Insurance began in 1981.
E Estimate.
NA Not available.

EXPORT-IMPORT BANK
TOTAL AUTHORIZATIONS OF LOANS AND GUARANTEES AND AUTHORIZATIONS IN SUPPORT OF AIRCRAFT EXPORTS

Fiscal Years 1974-1983
(Millions of Dollars)

Year	TOTAL AUTHORIZATIONS	Authorizations in Support of Aircraft Exports[a]			
		TOTAL	Percent of TOTAL Authorizations	Commercial Jet Aircraft	Other Aircraft[b]
LOANS[c]					
1974	$3,981	$ 946.2	23.8%	$ 894.6	$51.6
1975	2,701	710.4	26.3	691.2	19.2
1976	2,285	421.9	18.5	398.4	23.5
Tr. Qtr.	282	98.3	34.9	93.8	4.5
1977	747	139.0	18.6	137.6	1.4
1978	2,927	195.2	6.7	189.5	5.7
1979	3,825	1,427.7	37.3	1,399.4	28.3
1980	4,087	1,710.1	41.8	1,692.6	17.5
1981	5,079	2,555.0	50.3	2,550.3	4.7
1982	3,104	241.4	7.8	199.1	42.3
1983	685	383.8	56.0	383.8	—
GUARANTEES[d]					
1974	$1,594	$ 154.0	9.7%	$ 132.9	$21.1
1975	1,574	84.5	5.4	64.0	20.5
1976	1,661	107.6	6.5	87.2	20.4
Tr. Qtr.	272	62.6	23.0	58.7	3.9
1977	1,021	307.5	30.1	293.9	13.6
1978	589	97.6	16.6	77.2	20.4
1979	908	261.4	28.8	239.3	22.1
1980	2,510	1,131.9	45.1	1,088.1	43.8
1981	1,513	562.6	37.2	533.4	29.2
1982	727	104.2	14.3	78.4	25.8
1983	1,741	242.3	13.9	220.4	21.9

Source: Export-Import Bank of the United States.

a Includes complete aircraft, engines, and parts.

b Includes business aircraft, general aviation aircraft, helicopters, and related goods and services.

c Loans are commitments for direct financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits and loans authorized under the Cooperative Financing Facility (CFF), until the termination of the CFF program in 1981, but excluding Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank, in which case the value of the loans is included with Guarantees.

d Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions.

EXPORT-IMPORT BANK
SUMMARY OF COMMERCIAL JET AIRCRAFT AUTHORIZATIONS FOR LOANS[a] AND GUARANTEES[b]

Fiscal Years 1957-1983
(Values in Millions of Dollars)

Year	No. of Jets		Export Value		No. of Credits		Gross Authorizations	
	Loans	Guarantees	Loans	Guarantees	Loans	Guarantees	Loans	Guarantees
New Authorizations:								
1957[c]-1968	322	53	$ 2,572	$ 331	92	58	$ 1,520	$ 274
1969	55	23	451	207	23	18	197	111
1970	142	1	1,749	3	44	38	598	79
1971	126	9	1,539	40	58	49	481	363
1972	145	2	1,334	9	44	29	475	183
1973	129	4	1,729	25	60	23	690	191
1974	189	—	2,195	—	79	22	895	133
1975	136	1	2,070	5	64	10	691	64
1976	77	6	1,017	139	34	11	398	87
Tr. Qtr.	15	5	219	182	6	3	94	59
1977	31	25	330	902	16	14	138	294
1978	29	5	479	253	18	5	189	77
1979	118	7	2,938	317	35	10	1,399	239
1980	136	21	3,975	901	36	24	1,693	1,088
1981	121	18	4,568	637	26	17	2,550	533
1982	13	7	441	113	5	2	199	78
1983	23	3	779	61	3	4	384	220
Cumulative New Authorizations	1,807	190	28,385	4,125	643	337	12,590	4,073
Transfers & Reversals	—	—	(8)	—	4	—	(24)	(20)
Cumulative Gross Authorizations (net of Transfers & Reversals)	1,807	190	28,377	4,125	647	337	12,566	4,053

Source: Export-Import Bank of the United States.
NOTE: Detail may not add to totals because of rounding.

a Loans are commitments for direct financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits and loans authorized under the Cooperative Financing Facility (CFF) until the termination of the CFF program in 1981, but excluding Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank, in which case the value of the loans is included with Guarantees.

b Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions.

c First year of commercial jet aircraft authorizations.

employment

Strictly speaking, the aerospace industry's average employment in 1983 declined below the level of the previous year. Average employment was 1,151,000, down 11,000 from 1982's average of 1,162,000. The 1983 figure represented 6.2 percent of total employment in all U.S. manufacturing industries, the same percentage as in 1982.

However, use of the average employment figure—which is customary in this publication—is misleading in this instance, because it indicates an aerospace industry employment decline where actually the labor force was on the rise in the latter part of 1983 and the early months of 1984. The inconsistency is due to the fact that the average employment figure includes eight months of stagnant employment levels (January through August) that lowered the year's average even though industry employment increased substantially in the other months (September through December).

By year-end 1983, after four consecutive monthly increases, industry employment totaled 1,171,000 —some 20,000 above the year's average employment figure or the prior year-end figure. The work force continued to grow during the first quarter of 1984, reaching a total at the end of March of 1,185,000. That represented the highest industry employment level since January 1982, when employment began to decline because of reduced levels of civil aircraft production, particularly commercial transport production.

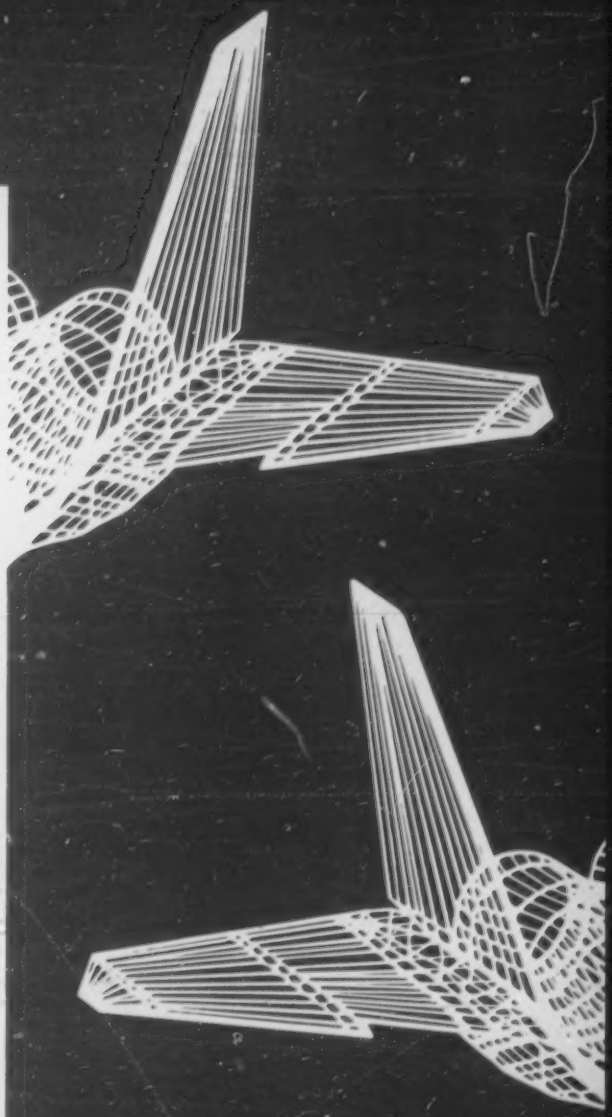
On the averging basis, employment among companies manufacturing aircraft, engines and parts fell off by 21,000 to a 1983 average of 580,000. An employment gain of 11,000—to an average of 143,000—was recorded among companies fabricating missiles and space systems, while the work force engaged in production of avionics grew by 2,000 to an average of 161,000. The "other parts and equipment" category dropped by 3,000 to a year's average of 267,000. Using year-end rather than average statistics, each of the industry segment figures was slightly higher, but there was still a net reduction in the number of workers engaged in aircraft, engines and parts production. Despite the reduction, aircraft manufacture continued to account for approximately half of the total industry labor force.

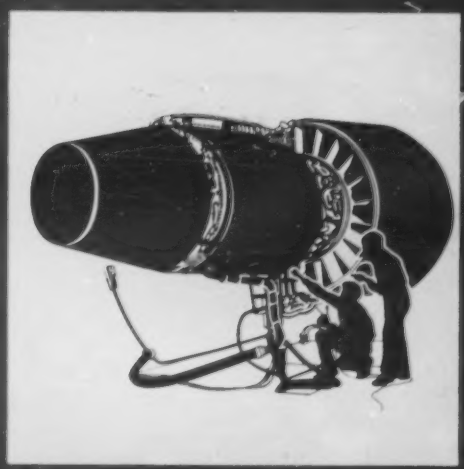
The number of production workers in the aerospace industry (on the annual average basis) declined slightly more than four percent, from 545,000 in 1982 to 522,000 in 1983. The drop was across the board, except for an

increase of 5,000 workers in the missile/space segment.

Increasing research and development activity resulted in an employment gain among aerospace scientists and engineers engaged in R&D work. They numbered (as of January 1983, the latest date for which statistics are available) 99,500, an increase of more than nine percent over the previous year's 91,100. In 1983, the aerospace scientist/engineer component represented 18.6 percent of all scientists and engineers employed in R&D capacities by all U.S. industries. The 1983 aerospace increase in scientists/engineers was greater than the all-industry experience: an increase from 510,000 in 1982 to 536,000 in 1983, a gain of about five percent.

The aerospace industry fared well in a Department of Labor survey of occupational injuries and illnesses in 1982 (latest data available), with injury and illness rates far below those of all U.S. manufacturing industries. The all-industry average for the year was 10.2 injury/illness cases, causing 75 lost workdays, for each 100 full-time workers. By contrast, employees in the aircraft and parts segment of the aerospace industry experienced only six cases causing 37 lost workdays. The rate in the missile/space segment was even lower: 2.7 cases, 19 lost workdays.





ANNUAL AVERAGE EMPLOYMENT IN ALL MANUFACTURING, DURABLE GOODS AND AEROSPACE INDUSTRIES

Calendar Years 1961-1983
(Thousands of Employees)

Year	All Manufacturing Industries	Durable Goods Industries	Aerospace Industry		
			TOTAL	As Percent of	
				All Manufacturing	Durable Goods
1961	16,326	9,070	1,178	7.2%	13.0%
1962	16,853	9,480	1,270	7.5	13.4
1963	16,995	9,616	1,267	7.5	13.2
1964	17,274	9,816	1,209	7.0	12.3
1965	18,062	10,405	1,175	6.5	11.3
1966	19,214	11,282	1,375	7.2	12.2
1967	19,447	11,439	1,484	7.6	13.0
1968	19,781	11,626	1,502	7.6	12.9
1969	20,167	11,895	1,402	7.0	11.8
1970	19,367	11,208	1,166	6.0	10.4
1971	18,623	10,636	951	5.1	8.9
1972	19,151	11,049	912	4.8	8.3
1973	20,154	11,891	956	4.7	8.0
1974	20,077	11,925	982	4.9	8.2
1975	18,323	10,688	941	5.1	8.8
1976	18,997	11,077	896	4.7	8.1
1977	19,682	11,597	893	4.5	7.7
1978	20,505	12,274	977	4.8	8.0
1979	21,040	12,760	1,109	5.3	8.7
1980	20,285	12,187	1,185	5.8	9.7
1981	20,170r	12,109r	1,201r	6.0	9.9
1982	18,853r	11,100r	1,162	6.2	10.5
1983	18,678	10,932	1,151	6.2	10.5

Source: Manufacturing and Durable Goods Employment from Bureau of Labor Statistics, "Employment and Earnings" (Monthly); Aerospace Employment from Aerospace Industries Association estimates based on "Employment and Earnings," Bureau of Labor Statistics.

NOTE: For explanation of "Aerospace Employment," see the Glossary.

r Revised.

ANNUAL PAYROLL
AEROSPACE INDUSTRY AND ALL MANUFACTURING INDUSTRIES

Calendar Years 1961-1982*
(Millions of Dollars)

Year	All Manufacturing Industries[b]	Aerospace[a]			Aerospace As Percent of All Manufacturing
		TOTAL	Production Workers	Other	
1961	$ 89,800	$ 9,140	$ 4,342	$ 4,798	10.2%
1962	96,700	10,232	4,871	5,361	10.6
1963	100,600	10,173	4,588	5,585	10.1
1964	107,100	10,067	4,563	5,504	9.4
1965	115,500	10,188	4,504	5,684	8.8
1966	128,000	12,139	5,641	6,498	9.5
1967	134,100	13,727	6,382	7,345	10.2
1968	145,800	14,397	6,582	7,815	9.9
1969	157,500	14,649	6,401	8,248	9.3
1970	158,200	12,275	5,322	6,953	7.8
1971	160,300	10,480	4,409	6,071	6.5
1972	175,400	10,504	4,280	6,224	6.0
1973	196,200	12,107	5,087	7,020	6.2
1974	211,400	13,535	5,672	7,863	6.4
1975	211,000	14,608	5,935	8,673	6.9
1976	237,400	14,881	5,951	8,930	6.3
1977	266,000	16,276	6,464	9,812	6.1
1978	299,200	19,501	7,873	11,628	6.5
1979	333,900	24,243	10,247	13,996	7.3
1980	354,600[r]	28,738	12,087	16,651	8.1
1981[r]	385,300	31,937	13,018	18,919	8.3
1982*	383,800	33,747	13,036	20,711	8.8

Source: Manufacturing Payroll from Bureau of Economic Analysis, "Survey of Current Business;" Aerospace Payroll from Aerospace Industries Association estimates.

a Based on AIA estimates of annual average employment and earnings for the aerospace industry; derived from BLS data (see Glossary, "Aerospace Employment" and "Aerospace Payroll").

b See Glossary, "Payroll, All Manufacturing."

r Revised.

* 1983 payroll data not available, pending resolution of BLS earnings index methodology to accommodate terms of recent aerospace company/labor union negotiations providing for periodic lump sum payments in lieu of general wage increases and/or COLA adjustments.

EMPLOYMENT IN THE AEROSPACE INDUSTRY[a]

Calendar Years 1968-1983
(Annual Average, Thousands of Employees)

Year	TOTAL	Aircraft, Engines, & Parts	Missiles & Space Vehicles	Avionics[b]	Other
TOTAL EMPLOYMENT					
1968	1,502	852	150	184	316
1969	1,402	804	124	179	295
1970	1,166	669	98	152	247
1971	951	531	88	129	203
1972	912	495	93	113	211
1973	956	525	93	116	222
1974	982	539	94	121	228
1975	941	514	93	116	218
1976	896	487	86	115	208
1977	893	482	83	121	207
1978	977	527	93	129	228
1979	1,109	611	102	139	257
1980	1,185	652	111	147	275
1981[r]	1,201	646	123	154	278
1982[r]	1,162	601	132	159	270
1983	1,151	580	143	161	267
PRODUCTION WORKERS					
1968	807	506	52	80	169
1969	746	464	41	86	155
1970	604	369	31	77	127
1971	480	285	26	66	103
1972	455	266	28	55	106
1973	482	284	29	57	112
1974	494	292	29	59	114
1975	461	271	29	54	107
1976	433	251	28	54	100
1977	429	247	26	56	100
1978	476	275	29	61	111
1979	562	332	33	67	130
1980	598	355	35	70	137
1981[r]	590	343	37	74	136
1982[r]	545	305	41	73	126
1983	522	283	46	72	121

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.
a See Glossary for detailed explanation of "Aerospace Employment."
b Communications, navigation, flight control, and displays.
r Revised.

EMPLOYMENT IN THE AIRCRAFT, ENGINES, AND PARTS INDUSTRY[a]

Calendar Years 1968-1983
(Annual Average, Thousands of Employees)

Year	TOTAL	Airframes	Engines and Parts	Other Parts and Equipment
TOTAL EMPLOYMENT				
1968	852.0	468.2	216.4	147.8
1969	804.4	456.7	205.0	142.7
1970	668.7	369.6	179.9	119.2
1971	530.8	287.7	150.6	92.6
1972	494.9	287.2	124.0	83.6
1973	524.9	300.5	132.6	91.8
1974	539.4	307.6	134.6	97.1
1975	514.0	292.8	126.3	94.9
1976	487.1	281.1	119.7	86.3
1977	481.7	270.4	120.9	90.4
1978	527.2	288.3	133.5	105.5
1979	610.8	333.2	151.6	126.1
1980	652.3	349.3	162.9	140.1
1981′	645.5	344.2	162.5	138.8
1982′	601.2	320.0	149.0	132.1
1983	579.8	308.0	141.9	130.0
PRODUCTION WORKERS				
1968	505.5	280.9	123.9	100.7
1969	464.0	255.1	114.1	94.8
1970	369.3	197.0	95.0	77.3
1971	284.5	147.1	79.0	58.4
1972	266.2	145.1	68.6	52.5
1973	284.2	151.5	74.2	58.5
1974	291.9	154.4	75.2	62.3
1975	271.1	140.9	70.5	59.7
1976	250.7	132.2	65.6	53.0
1977	246.8	124.4	66.6	55.8
1978	275.4	133.9	75.3	66.2
1979	332.1	165.9	86.4	79.8
1980	354.6	173.7	93.0	88.0
1981′	343.0	167.0	92.4	83.6
1982′	305.4	144.7	84.3	76.3
1983	282.6	132.9	75.7	74.0

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).
NOTE: Detail may not add to totals because of rounding.
a See Glossary for detailed explanation of "Aerospace Employment."

AVERAGE EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1982*

Year	TOTAL[a]	Aircraft				Guided Missiles, Space Vehicles & Parts
		TOTAL	Airframes	Engines and Parts	Other Parts and Equipment	
AVERAGE HOURLY EARNINGS[b]						
1972	$ 4.63	$ 4.62	$ 4.65	$ 4.72	$ 4.42	$ 4.75
1973	4.99	4.99	5.09	5.04	4.70	5.02
1974	5.43	5.42	5.58	5.41	5.05	5.48
1975	6.00	6.00	6.21	6.04	5.47	6.02
1976	6.44	6.44	6.63	6.46	5.95	6.48
1977	6.93	6.92	7.07	7.05	6.44	7.04
1978	7.54	7.54	7.70	7.80	6.93	7.56
1979	8.26	8.26	8.50	8.53	7.48	8.25
1980	9.27	9.28	9.66	9.42	8.40	9.22
1981	10.29	10.31	10.74	10.41	9.35[r]	10.06
1982*	11.20[r]	11.23[r]	11.85	11.16	10.18[r]	10.96
AVERAGE WEEKLY EARNINGS[b]						
1972	$186.62	$185.26	$180.89	$193.52	$186.52	$199.50
1973	202.95	202.10	199.53	209.66	199.75	211.34
1974	221.10	220.59	222.08	221.81	213.62	226.32
1975	247.53	247.80	255.85	247.04	228.65	245.01
1976	263.31	263.40	273.16	259.69	245.74	262.44
1977	289.76	289.95	296.23	291.87	273.70	287.94
1978	318.05	318.19	324.17	325.26	298.68	316.76
1979	350.64	351.05	359.55	360.82	322.39	346.50
1980	388.71	389.76	403.79	393.76	357.84	378.02
1981	424.31[r]	425.80	443.56	421.61	396.44[r]	410.45
1982*	459.99[r]	461.55[r]	484.67	454.21	426.54[r]	448.26[r]

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.
a TOTAL column is a weighted average based on BLS employment data.
b Includes overtime premiums.
r Revised.
* 1983 average annual data not available, pending resolution of BLS index methodology to accommodate terms of recent aerospace company/labor union negotiations providing for periodic lump sum payments in lieu of general wage increases and/or COLA adjustments.

AVERAGE EARNINGS IN THE AEROSPACE INDUSTRY IN CONSTANT DOLLARS[a]

Production Workers Only
Calendar Years 1972-1982*

Year	TOTAL[b]	Aircraft				Guided Missiles, Space Vehicles & Parts
		TOTAL	Airframes	Engines and Parts	Other Parts and Equipment	
AVERAGE HOURLY EARNINGS[c] IN CONSTANT DOLLARS (1972 = 100)[a]						
1972	$ 4.63	$ 4.62	$ 4.65	$ 4.72	$ 4.42	$ 4.75
1973	4.70	4.70	4.79	4.75	4.43	4.73
1974	4.61	4.60	4.73	4.59	4.28	4.65
1975	4.66	4.66	4.83	4.69	4.25	4.68
1976	4.73	4.73	4.87	4.75	4.37	4.76
1977	4.78	4.78	4.88	4.87	4.44	4.86
1978	4.84	4.84	4.94	5.00	4.45	4.85
1979	4.76	4.76	4.90	4.92	4.31	4.76
1980	4.71	4.71	4.90	4.78	4.26	4.68
1981	4.73	4.74	4.94	4.79	4.30[r]	4.63
1982*	4.85[r]	4.87[r]	5.14	4.84	4.41[r]	4.75
AVERAGE WEEKLY EARNINGS[c] IN CONSTANT DOLLARS (1972 = 100)[a]						
1972	$186.62	$185.26	$180.89	$193.52	$186.52	$199.50
1973	191.10	190.30	187.88	197.42	188.09	199.00
1974	187.53	187.10	188.36	188.13	181.19	191.96
1975	192.33	192.54	198.80	191.95	177.66	190.37
1976	193.47	193.53	200.71	190.81	180.56	192.83
1977	199.97	200.10	204.44	201.43	188.89	198.72
1978	204.01	204.10	207.93	208.63	191.58	203.18
1979	202.10	202.33	207.23	207.97	185.82	199.71
1980	197.31	197.85	204.97	199.88	181.64	191.89
1981	195.17[r]	195.86	204.03	193.93	182.36[r]	188.80
1982*	199.39[r]	200.07[r]	210.09	196.88	184.89[r]	194.30[r]

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

a Based on Consumer Price Index (CPI), published by the Bureau of Labor Statistics with 1967 base year, converted to 1972 base year by AIA.

b TOTAL column is a weighted average based on BLS employment data.

c Includes overtime premiums.

r Revised.

* 1983 average annual data not available, pending resolution of BLS index methodology to accommodate terms of recent aerospace company/labor union negotiations providing for periodic lump sum payments in lieu of general wage increases and/or COLA adjustments.

AVERAGE HOURS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1982

AVERAGE WEEKLY HOURS

Year	TOTAL[a]	Aircraft				Guided Missiles, Space Vehicles, & Parts
		TOTAL	Airframes	Engines and Parts	Other Parts and Equipment	
1972	40.2	40.0	38.9	40.9	42.2	41.9
1973	40.6	40.5	39.2	41.6	42.5	42.1
1974	40.8	40.7	39.8	41.0	42.3	41.3
1975	41.2	41.3	41.2	40.9	41.8	40.7
1976	40.9	40.9	41.2	40.2	41.3	40.5
1977	41.8	41.9	41.9	41.4	42.5	40.9
1978	42.2	42.2	42.1	41.7	43.1	41.9
1979	42.5	42.5	42.3	42.3	43.1	42.0
1980	41.9	42.0	41.8	41.8	42.6	41.0
1981	41.3	41.3	41.3	40.5	42.4	40.8
1982*	41.1	41.1	40.9	40.7	41.9r	40.9r

AVERAGE WEEKLY OVERTIME HOURS

Year	TOTAL[a]	Aircraft, Engines, and Parts	Guided Missiles, Space Vehicles, and Parts
1972	3.0	3.0	2.6
1973	3.2	3.3	2.7
1974	3.3	3.3	3.0
1975	3.0	3.0	3.3
1976	2.7	2.7	2.7
1977	3.5	3.5	3.2
1978	4.4	4.4	4.1
1979	4.7	4.7	4.4
1980	4.1	4.2	3.6
1981	3.5	3.5	3.2
1982*	3.2	3.2	3.1

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.
a TOTAL column is a weighted average based on BLS employment data.
r Revised
* 1983 average annual data not available, pending resolution of BLS index methodology to accommodate terms of recent airframe company/labor union negotiations providing for periodic lump sum payments in lieu of general wage increases and/or COLA adjustments.

OCCUPATIONAL INJURY AND ILLNESS INCIDENCE RATES[a] ALL MANUFACTURING AND AEROSPACE INDUSTRIES

Calendar Years 1978-1982

	1978	1979	1980	1981	1982
All Manufacturing:					
Total Cases	13.2	13.3	12.2	11.5	10.2
Lost Workday Cases	5.6	5.9	5.4	5.1	4.4
Nonfatal Cases without Lost Workdays	7.6	7.4	6.8	6.4	5.8
Lost Workdays	84.9	90.2	86.7	82.0	75.0
Aircraft and Parts (SIC 372):					
Total Cases	6.5	7.1	6.8	6.2	6.0
Lost Workday Cases	2.5	3.0	2.9	2.6	2.3
Nonfatal Cases without Lost Workdays	4.0	4.1	3.8	3.6	3.6
Lost Workdays	37.7	49.1	46.9	41.7	36.9
Aircraft (SIC 3721):					
Total Cases	4.8	5.2	4.8	4.8	4.8
Lost Workday Cases	1.9	2.4	2.0	1.8	1.7
Nonfatal Cases without Lost Workdays	2.9	2.8	2.8	2.9	3.1
Lost Workdays	31.6	44.0	35.1	29.7	29.5
Aircraft Engines and Parts (SIC 3724):					
Total Cases	7.1	8.0	7.8	6.6	6.6
Lost Workday Cases	3.0	3.5	4.0	3.6	3.3
Nonfatal Cases without Lost Workdays	4.1	4.5	3.7	3.0	3.3
Lost Workdays	43.1	55.0	68.3	64.7	51.5
Aircraft Parts (SIC 3728):					
Total Cases	11.2	10.9	10.6	9.4	8.1
Lost Workday Cases	3.7	4.0	3.9	3.4	2.8
Nonfatal Cases without Lost Workdays	7.5	6.9	6.7	6.0	5.3
Lost Workdays	49.6	55.8	53.4	45.1	39.1
Guided Missiles, Space Vehicles & Parts (SIC 376):					
Total Cases	4.2	3.1	3.1	2.6	2.7
Lost Workday Cases	1.5	1.4	1.4	1.2	1.2
Nonfatal Cases without Lost Workdays	2.7	1.7	1.7	1.4	1.5
Lost Workdays	23.0	20.8	21.9	19.2	19.1
Guided Missiles & Space Vehicles (SIC 3761):					
Total Cases	3.6	2.7	2.9	2.1	2.1
Lost Workday Cases	1.4	1.3	1.3	1.0	0.9
Nonfatal Cases without Lost Workdays	2.2	1.4	1.6	1.0	1.2
Lost Workdays	20.3	19.9	20.9	17.3	16.3
Space Propulsion Units & Parts (SIC 3764):					
Total Cases	7.2	4.2	3.5	4.1	3.9
Lost Workday Cases	2.5	1.8	1.8	1.9	1.9
Nonfatal Cases without Lost Workdays	4.7	2.4	1.7	2.2	1.9
Lost Workdays	38.0	25.5	23.8	25.7	28.7
Other Space Vehicle Equipment (SIC 3769):					
Total Cases	4.8	5.1	4.2	4.6	5.4
Lost Workday Cases	1.7	1.4	2.1	1.7	1.6
Nonfatal Cases without Lost Workdays	3.1	3.7	2.1	2.9	3.8
Lost Workdays	23.6	20.9	28.2	23.0	26.7

Source: Department of Labor, Bureau of Labor Statistics, "Occupational Injuries and Illnesses" (Annually).

a Defined as the number of injuries and illnesses per 100 full-time workers. Separate incidence rates also available for occupational injuries only.

EMPLOYMENT AND COST OF R&D SCIENTISTS AND ENGINEERS ALL INDUSTRIES AND AEROSPACE INDUSTRY

1972-1983

Year	Employment[a]			Cost per R&D Scientist and Engineer[d]	
	All Industries[b] (Thousands)	Aerospace[c] (Thousands)	Aerospace as a Percent of All Industries	All Industries[b]	Aerospace[c]
1972	350.2	70.8	20.2%	$ 55,300	$ 69,200
1973	357.7	72.1	20.2	59,200	70,800
1974	360.0	70.6	19.6	63,300	76,400
1975	363.3	67.5	18.6	66,500	85,100
1976	364.4	66.9	18.4	72,200	91,300
1977	382.8	72.0	18.8	75,800	91,300
1978	404.4	82.0	20.3	80,400	89,400
1979	423.9	86.5	20.4	87,400	93,300
1980	450.6	85.9	19.1	94,900	101,600
1981	487.8	95.2	19.5	103,900	128,400
1982	509.8	91.1	17.9	112,800	147,400
1983	535.6	99.5	18.6	NA	NA

Source: National Science Foundation.
a Employment as of January. Scientists and engineers working less than full time have been included in terms of their full time equivalent number.
b All manufacturing industries and those non-manufacturing industries known to conduct or finance research and development.
c SIC codes 372 and 376.
d The arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years, divided into the total R&D expenditures of each industry during the earlier year.
NA Not available.

AEROSPACE INDUSTRY WORK STOPPAGES[a]

Calendar Years 1967-1983

Year[b]	Number of Strikes[c]	Number of Workers Involved	Man-Days Idle in Year	Year[b]	Number of Strikes[c]	Number of Workers Involved	Man-Days Idle in Year
1967	22	28,800	160,800	1976	21	13,000	330,500
1968	46	45,500	594,300	1977	21	46,700	1,832,200
1969	26	76,400	1,564,600	1978	17	13,700	741,200
1970	12	6,800	552,500	1979	12	6,600	103,400
1971	24	17,200	465,500	1980	17	4,400	92,900
1972	18	2,800	148,100	1981	12	6,100	188,900
1973	13	4,500	99,100	1982	4	11,900	45,200
1974	27	16,800	370,000	1983	2	8,700	404,100
1975	20	22,800	1,245,600				

Source: Department of Labor, Bureau of Labor Statistics, Division of Wages and Industry Relations.
a Based on SIC 372 of the 1967 Code, which includes space vehicle equipment not elsewhere classified but excludes guided missiles and space vehicles, and space propulsion units and parts.
b Effective 1982, data not available for work stoppages involving fewer than 1,000 employees.
c Strikes beginning during calendar year.

EMPLOYMENT IN NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PROGRAMS

End of Fiscal Years 1960-1985

Year	TOTAL	NASA Employees	Contractor Employees[a]
1960	46,768	10,268	36,500
1961	74,577	17,077	57,500
1962	137,656	22,156	115,500
1963	246,304	27,904	218,400
1964	379,084	31,984	347,100
1965	409,900	33,200	376,700
1966	393,924	33,924	360,000
1967	306,926	33,726	273,200
1968	267,871	32,471	235,400
1969	218,345	31,745	186,600
1970	160,850	31,350	129,500
1971	143,578	29,478	114,100
1972	138,800	27,500	111,300
1973	134,850	26,850	108,000
1974	125,220	25,020	100,200
1975	127,733	24,333	103,400
1976	130,739	24,039	108,000
1977	124,136	23,636	100,500
1978	124,637	23,237	101,400
1979	131,931	22,831	109,100
1980	135,613	22,613	113,000
1981	133,473	21,873	111,600
1982	127,952	21,652	106,300
1983	129,246	22,246	107,000
1984[E]	137,000	22,000	115,000
1985[E]	137,000	22,000	115,000

Source: NASA Briefing on the Budget of the United States (Annually), and NASA Headquarters.

a Includes estimates of manpower for hardware and related contracts, as well as actual work-years for support service contracts.

E Estimate.

finance

In 1983, the aerospace industry recorded a net profit after taxes of $2.8 billion. The figure compares with $2.2 billion in the previous year and with the all-time high of $3 billion earned in 1981.

Expressed as a percentage of sales, the profit rate was 3.8 percent in 1983, up from 3.3 percent in 1982. The aerospace improvement was consistent with the experience of U.S. manufacturers in general, whose average profit rate increased substantially over 1982 as the nation's economic recovery gained momentum. The 1983 aerospace rate compares with an average profit of 4.1 percent for all U.S. manufacturing corporations.

Measured as a percentage of assets, the 1983 aerospace profit was 4.5 percent, up from 3.7 percent in the previous year; as a percentage of equity, it amounted to 13.9 percent, up from 12 percent. While aerospace profit rates measured as percentages of sales or assets are usually well below the average for all manufacturing corporations, they have been consistently higher than the all-industry average in recent years when measured as a percentage of equity. The reason, in one industry view, is not that aerospace equity has fallen, but that aerospace profits have climbed more rapidly than industry as a whole in the years since 1977. The improved profitability is due to a variety of factors, including high levels of activity in virtually all aerospace categories.

Aerospace plant and equipment expenditures dipped in 1983 to $4.9 billion; the figure compares with $6 billion in 1982, $6.4 billion in 1981 and $7 billion in 1980, the latter an all-time record. The declines in 1982 and 1983 matched similar declines among U.S. manufacturing industries in general. However, estimates of aerospace plant and equipment outlays in 1984 indicated a rise of almost 11 percent to $5.5 billion; this compares with various projections ranging from 9.9 percent to 16.9 percent for U.S. business as a whole.

The aerospace balance sheet for 1983 showed an increase in total assets—up $4 billion to $63.4 billion—and in total stockholders' equity—up $2.6 billion to $21 billion. Net working capital increased from $7.9 billion in 1982 to $8.1 billion in 1983.

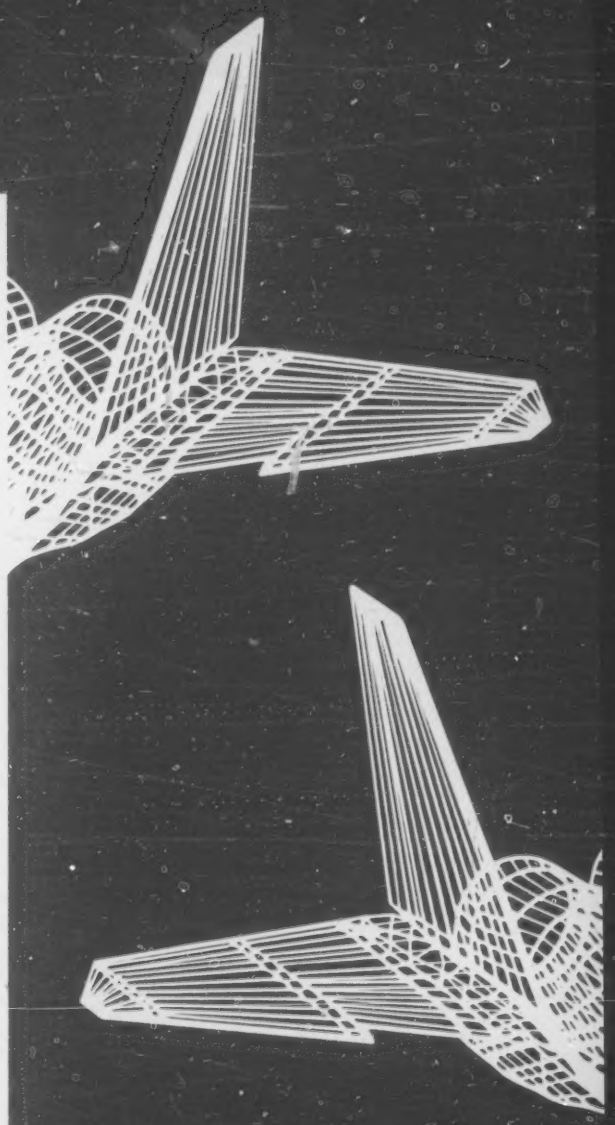
In terms of contract dollar value, General Dynamics Corporation retained its ranking at the top of the list of companies awarded Department of Defense contracts during Fiscal Year 1983. General Dynamics received contracts valued at $6.8 billion; McDonnell Douglas Corporation placed second (same ranking as in the previous year) with $6.1 billion. Rockwell International Corporation moved up from eighth place in 1982 to third in 1983, with contracts worth $4.54 billion. Rounding out the top 10 were General Electric Company ($4.51 billion); The Boeing Company ($4.4 billion); Lockheed Corporation ($4 billion); United Technologies Corporation ($3.9 billion); Tenneco Inc. ($3.8 billion); Hughes Aircraft Company ($3.2 billion); and Raytheon Company ($2.7 billion). With the exception of Tenneco, all were in the top 10 in the preceding year.

A Department of Defense analysis of FY 1983 prime contract awards by geographic region showed the Pacific region atop the list in three aerospace categories—aircraft, missile/

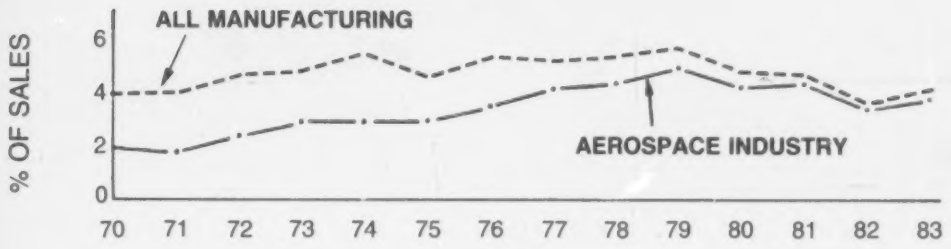
space systems, and electronics/communications equipment. The Pacific region led in aircraft-related contracts with awards totaling $6.4 billion, 22.7 percent of the total. In second place was the West North Central region with $5.2 billion in contracts, 18.6 percent. The New England area was third in the aircraft category with $3.8 billion, 13.6 percent.

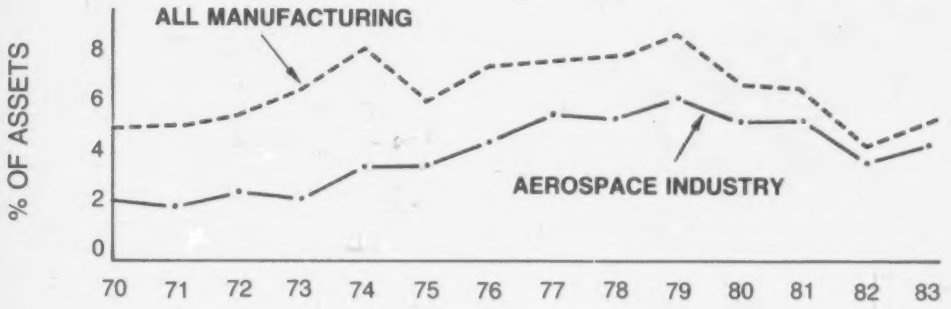
In missiles/space, the Pacific region dominated with $7.5 billion, 46.9 percent of the total. New England had $2.07 billion (12.9 percent) and the South Atlantic region $2.06 billion (12.8 percent). Pacific led the electronics/communications category with $6.3 billion and 33.2 percent, followed by South Atlantic ($3.5 billion-plus, 18.7 percent) and Middle Atlantic ($3.5 billion, 18.5 percent).

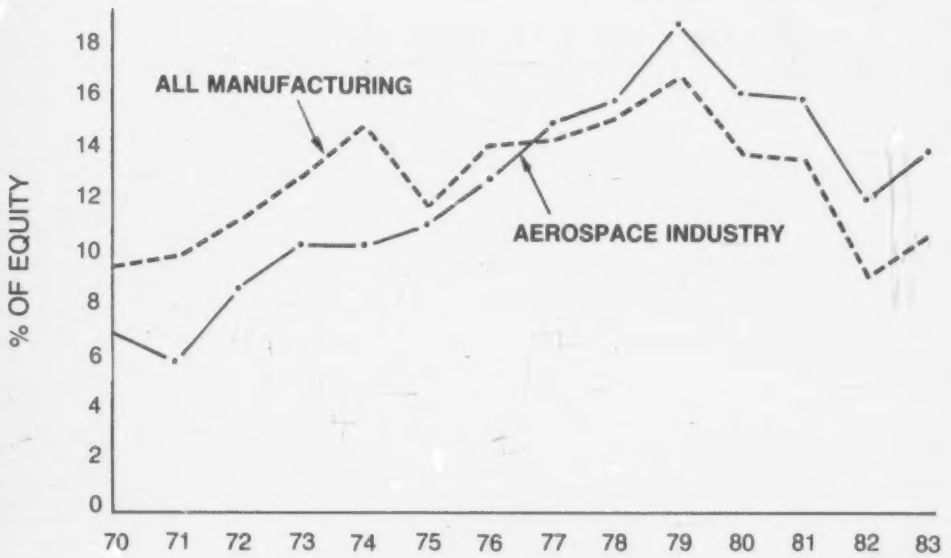
Heading the list of NASA prime contractors in FY 1983 was Rockwell International Corporation. Rockwell, which has topped the list every year since the start of the Space Shuttle program, received contracts valued at $1.6 billion. Martin Marietta Corporation, which has been the second largest NASA contractor for several years, was again second with contracts totaling $466 million. Morton Thiokol, Inc. moved up to third place (from fourth in the preceding year) with contracts worth $268 million. McDonnell Douglas Corporation ($237 million) dropped from third to fourth, and General Dynamics Corporation ($156 million) remained in fifth place. The rest of the top 10 included Computer Sciences Corporation ($147 million); Bendix Corporation ($137 million); United Technologies Corporation ($116 million); IBM Corporation ($116 million); and United Space Boosters, Inc. ($115 million). All of the latter companies had been in the top 10 in the preceding year.



NET PROFIT AFTER TAXES







Source: Aerospace Industries Association

NET PROFIT AFTER TAXES AS A PERCENT OF SALES, ASSETS, AND EQUITY FOR ALL MANUFACTURING CORPORATIONS AND THE AEROSPACE INDUSTRY

Calendar Years 1970-1983

AS A PERCENT OF SALES

Year	All Manufacturing Corporations	Non-Durable Goods	Durable Goods	Aerospace[a] Industry
1970	4.0%	4.5%	3.6%	2.0%
1971	4.1	4.5	3.8	1.8
1972	4.4	4.6	4.3	2.4
1973	4.7	5.0	4.5	2.9
1974	5.5	6.4	4.7	2.9
1975	4.6	5.1	4.1	2.9
1976	5.4	5.5	5.2	3.4
1977	5.3	5.3	5.3	4.2
1978	5.4	5.4	5.5	4.4
1979	5.7	6.1	5.2	5.0
1980	4.8	5.6	4.0	4.3
1981	4.7	5.1	4.3	4.4
1982	3.5	4.6r	2.4	3.3r
1983	4.1	4.9	3.1	3.8

AS A PERCENT OF ASSETS[b] AND EQUITY[b]

Year	All Manufacturing Corporations		Aerospace Industry[a]	
	Percent of Assets	Percent of Equity	Percent of Assets	Percent of Equity
1970	4.9%	9.3%	2.2%	6.8%
1971	5.1	9.7	2.0	5.8
1972	5.5	11.1	2.7	8.6
1973	6.5	12.8	2.4	10.3
1974	8.0	14.9	3.7	10.4
1975	6.2	11.6	3.8	11.0
1976	7.5	14.0	4.7	12.8
1977	7.6	14.2	5.7	14.9
1978	7.8	15.0	5.5	15.7
1979	8.4	16.5	6.3	18.4
1980	6.9	13.9	5.2	16.0
1981	6.7	13.6	5.2	15.9
1982	4.5	9.2	3.7r	12.0r
1983	5.2	10.6	4.5	13.9

Source: Bureau of the Census and Federal Trade Commission, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

a Based on a sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

b Average of four quarters.

r Revised.

INCOME STATEMENT FOR AEROSPACE COMPANIES

Calendar Years 1979-1983
(Millions of Dollars)

	1979	1980	1981	1982r	1983
Net Sales	$51,801	$60,638	$67,519	$66,198	$73,397
Income from Operations	3,606	3,659	3,754	3,090	4,081
Total Income before Income Taxes	3,711	3,647	4,665	3,272	4,442
Provision for Current & Deferred Domestic Income Taxes	1,489	1,341	1,699	1,081	1,675
As a Percent of Total Income	40.1%	36.8%	36.4%	33.0%	37.7%
Net Profit after Taxes	2,614	2,588	2,966	2,193	2,767
As a Percent of Net Sales	5.0%	4.3%	4.4%	3.3%	3.8%
Net Profit Retained in Business	1,897	1,790	2,068	1,350	1,886

Source: Bureau of the Census and Federal Trade Commission, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

NOTE: Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts. During the first quarter of 1983, a considerable number of companies were reclassified by industry. To provide comparability, the Bureau of the Census has restated 1982 data to reflect these reclassifications, resulting in a downward adjustment for the aerospace industry.

r Revised

BALANCE SHEET FOR AEROSPACE COMPANIES[a]

December 31, 1979-1983
(Millions of Dollars)

	1979	1980	1981	1982[r]	1983
Assets:					
Current Assets					
Cash[b]	$ 3,001	$ 562	$ 1,056	$ 891	$ 1,925
U.S. Government Securities	79	} 2,250	} 2,876	} 1,317	} 1,712
Other Securities/Com'l Paper[b]	564				
Total Cash and U.S. Government Securities	$ 3,645	$ 2,812	$ 3,932	$ 2,208	$ 3,637
Receivables (Total)	5,237	5,991	5,979	6,305	7,919
Inventories (Gross)	20,491	26,497	30,011	31,006	30,290
Other Current Assets	844	834	870	639	639
Total Current Assets	$30,217	$36,135	$40,792	$40,159	$42,484
Net Plant, Property & Equipment	7,261	9,368	10,952	12,229	13,127
Other Non-Current Assets	7,041	6,935	7,445	7,041	7,769
Total Assets	$44,518	$52,437	$59,190	$59,428	$63,380
Liabilities:					
Current Liabilities					
Short Term Loans	$ 698	$ 1,198	$ 1,702	$ 1,174	$ 708
Advances by U.S. Gov't.	6,554	(c)	(c)	(c)	(c)
Trade Accts. & Notes Payable	4,266	5,095	5,213	5,859	5,422
Income Taxes Accrued	2,742	2,769	2,538	2,771	3,389
Installments Due on Long Term Debts	272	178	279	344	348
Other Current Liabilities	9,342	19,589	22,092	22,157	24,541
Total Current Liabilities	$23,873	$28,830	$31,825	$32,307	$34,409
Long Term Debt	3,975	4,525	5,383	5,822	4,501
Other Non-Current Liabilities	1,356	2,123	2,930	2,896	3,474
Total Liabilities	$29,204	$35,478	$40,137	$41,025	$42,384
Stockholders' Equity:					
Capital Stock	$ 5,013	$ 5,072	$ 5,491	$ 4,704	$ 5,430
Retained Earnings	10,301	11,888	13,561	13,700	15,567
Total Stockholders' Equity	$15,315	$16,959	$19,053	$18,404	$20,996
Total Liabilities & Stockholders' Equity	$44,518	$52,437	$59,190	$59,428	$63,380
Net Working Capital	$ 6,344	$ 7,304	$ 8,967	$ 7,852	$ 8,075

Source: Bureau of the Census and Federal Trade Commission, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

NOTE: Detail may not add to totals because of rounding.

a Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles and parts. During the first quarter of 1983, a considerable number of companies were reclassified by industry. To provide comparability, the Bureau of the Census has restated 1982 data to reflect these reclassifications, resulting in a downward adjustment for the aerospace industry.

b Effective 1980, deposits outside U.S. included in "Other Securities & Commercial Paper;" they previously were included in "Cash" (on hand and in banks).

c Included in "Other Current Liabilities."

r Revised.

NEW PLANT AND EQUIPMENT EXPENDITURES

Calendar Years 1960-1984
(Billions of Dollars)

Year	All Industries[a]	All Manufacturing Industries	Durable Goods	Aerospace	
				Current Dollars	Constant Dollars 1972 = 100
1960	$ 39.08	$ 16.36	$ 8.28	$0.34	$0.49
1961	38.02	15.53	7.43	0.30	0.43
1962	40.53	16.03	7.81	0.40	0.57
1963	43.33	17.27	8.64	0.44	0.61
1964	50.90	21.23	10.98	0.41	0.56
1965	59.15	25.41	13.49	0.53	0.71
1966	70.00	31.37	17.23	1.17	1.52
1967	72.35	32.25	17.83	1.25	1.58
1968	75.95	32.34	17.93	1.23	1.49
1969	85.25	36.27	19.97	1.29	1.49
1970	91.37	36.99	19.80	0.88	0.96
1971	92.26	33.60	16.78	0.63	0.66
1972	102.73	35.42	18.22	0.68	0.63
1973	118.54	42.37	22.75	0.87	0.82
1974	137.20	53.21	27.44	1.51	1.31
1975	138.28	54.92	26.33	1.68	1.34
1976	150.91	59.95	28.47	1.69	1.28
1977	174.68	69.22	34.04	2.01	1.44
1978	203.54	79.72	40.43	3.22	2.14
1979	240.22	98.68	51.07	5.27	3.22
1980	264.44	115.81	58.91	7.03	3.94
1981	289.37	126.79	61.84	6.43	3.30[r]
1982	282.71	119.68	56.44	6.04	2.92[r]
1983	269.22	111.53	51.78	4.93	2.29
1984[E]	308.98	128.76	61.40	5.46	2.42

Source: U S. Department of Commerce, Bureau of Economic Analysis, Quarterly Report. Aerospace constant dollars based on GNP implicit price deflator.

a Revised from previously published data for 'Total Nonfarm Business' to exclude selected nonmanufacturing industries.

E Estimate.

r Revised.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MAJOR CONTRACTORS

Fiscal Years 1979-1983
By rank according to net value of NASA prime contracts awarded during last fiscal year
(Millions of Dollars)

Company	1979	1980	1981	1982	1983
TOTAL PROCUREMENTS	$4,212	$4,843	$5,408	$5,884	$6,797
Awards to Business Firms	3,417	3,868	4,273	4,806	5,586
Percent of TOTAL PROCUREMENTS	81%	80%	79%	82%	89%
Rockwell International Corp.	$1,072	$1,273	$1,471	$1,564	$1,568
Martin Marietta Corp.	178	233	261	310	466
Morton Thiokol Inc.	78	79	105	152	268
McDonnell Douglas Corp.	114	160	198	220	237
General Dynamics Corp.	47	46	66	114	156
Computer Sciences Corp.	93	112	129	138	147
Bendix Corp.	100	97	103	109	137
United Technologies Corp.	73	75	71	90	116
I.B.M. Corp.	93	84	95	107	116
United Space Boosters Inc.	33	43	65	127	115
Ford Aerospace & Communications	35	48	62	74	107
Lockheed Engrg. & Mgmt. Co. Inc.	51	59	61	89	101
Lockheed Missiles & Space Co.	36	47	43	69	96
Boeing Services International	58	59	81	82	86
General Electric Co.	121	114	104	97	85
Perkin Elmer Corp.	31	43	51	44	70
E G & G Florida Inc.	(a)	(a)	(a)	(a)	68
Planning Research Corp.	35	38	44	55	57
RCA Corp.	51	32	27	24	57
Hughes Aircraft Co.	71	68	53	40	51
TRW Inc.	29	42	37	44	49
Teledyne Industries Inc.	13	20	23	29	47
Boeing Co.	43	45	40	41	44
Ball Corp.	22	21	30	26	39
Pan American World Service Inc.	27	32	34	35	36
Singer Co.	27	28	30	33	35
Northrop Services Inc.	20	22	24	25	29
Sperry Corp.	20	18	24	26	27
Air Products & Chemicals Inc.	19	17	26	25	25
Honeywell Information Systems	16	14	13	18	23

Source: National Aeronautics and Space Administration, "NASA Annual Procurement Report," (Annually).
a Not in list of major contractors for indicated years.

DEPARTMENT OF DEFENSE MAJOR CONTRACTORS

Fiscal Years 1979-1983
Listed by rank according to net value of prime contracts awarded during last fiscal year[a]
(Millions of Dollars)

Company	1979	1980	1981	1982	1983
TOTAL CONTRACTS	$63,252	$76,807	$97,389	$116,660	$128,242
General Dynamics Corp.	3,492	3,518	3,402	5,891	6,818
McDonnell Douglas Corp.	3,229	3,247	4,409	5,630	6,143
Rockwell International Corp.	684	969	1,126	2,691	4,545
General Electric Co.	2,042	2,202	3,018	3,654	4,518
Boeing Co.	1,515	2,385	2,683	3,239	4,423
Lockheed Corp.	1,797	2,037	2,657	3,499	4,006
United Technologies Corp.	2,554	3,109	3,776	4,208	3,867
Tenneco Inc.	1,093	1,524	1,151	845	3,762
Hughes Aircraft Co.	1,557	1,819	2,552	3,141	3,240
Raytheon Co.	1,249	1,745	1,826	2,262	2,728
Grumman Corp.	1,364	1,322	1,710	1,900	2,298
Martin Marietta Corp.	519	809	1,287	2,008	2,272
Litton Industries Inc.	832	652	1,385	1,317	2,169
Westinghouse Electric Corp.	660	932	1,125	1,492	1,778
IBM Corp.	553	497	805	1,197	1,421
LTV Corp.	478	511	548	548	1,343
FMC Corp.	352	835	1,052	1,371	1,236
RCA Corp.	487	589	877	996	1,181
TRW Inc.	436	508	517	869	1,137
Sperry Corp.	778	845	928	1,149	1,133
Honeywell Inc.	658	687	838	1,217	1,114
Ford Motor Co.	338	396	544	897	1,072
General Motors Corp.	449	509	622	690	893
American Telephone & Telegraph Co.	570	597	695	753	878
Exxon Corp.	341	480	1,152	841	874
Northrop Corp.	800	1,227	623	1,598	847
Allied Corp.[b]	297	322	458	592	778
Maersk Line Ltd.	(c)	(c)	(c)	(c)	691
Avco Corp.	138	287	493	668	676
GTE Corp.	227	310	426	567	674

Source: Department of Defense, "100 Companies Receiving the Largest Dollar Volume of Prime Contract Awards," (Annually).

a Effective 1980, data include DOD contract awards for civil functions, while data for prior years were limited to military prime contract awards.

b For 1979-1982, data represent Bendix Corporation.

c Not in top 100 companies for the listed year.

DEPARTMENT OF DEFENSE
PRIME CONTRACT AWARDS OVER $25,000[a]
FOR SELECTED MAJOR MILITARY HARD GOODS

By Geographic Region
Fiscal Years 1981, 1982, 1983

Program and Region	Millions of Dollars			Percent of Program Total		
	1981	1982	1983	1981	1982	1983
AIRCRAFT—TOTAL	$19,021	$23,326	$27,997	100.0%	100.0%	100.0%
New England	4,204	4,216	3,812	22.1	18.1	13.6
Middle Atlantic	2,825	3,012	3,685	14.9	12.9	13.2
East North Central	1,362	1,787	1,941	7.2	7.7	6.9
West North Central	3,562	4,815	5,206	18.7	20.6	18.6
South Atlantic	2,102	2,649	3,372	11.1	11.4	12.0
East South Central	181	194	272	1.0	0.8	1.0
West South Central	2,484	2,227	3,048	13.1	9.5	10.9
Mountain	192	407	311	1.0	1.7	1.1
Pacific[b]	2,108	4,018	6,350	11.1	17.2	22.7
MISSILE & SPACE SYSTEMS—TOTAL	$11,474	$14,271	$16,009	100.0%	100.0%	100.0%
New England	1,715	1,861	2,070	14.9	13.0	12.9
Middle Atlantic	768	804	682	6.7	5.6	4.3
East North Central	197	311	294	1.7	2.2	1.8
West North Central	703	802	845	6.1	5.6	5.3
South Atlantic	916	1,557	2,055	8.0	10.9	12.8
East South Central	156	168	277	1.4	1.2	1.7
West South Central	404	781	935	3.5	5.5	5.8
Mountain	1,208	1,433	1,340	10.5	10.0	8.4
Pacific[b]	5,406	6,554	7,511	47.1	45.9	46.9
ELECTRONICS & COMMUNICATIONS EQUIPMENT—TOTAL	$12,871	$16,125	$18,905	100.0%	100.0%	100.0%
New England	1,231	1,938	2,091	9.6	12.0	11.1
Middle Atlantic	2,255	3,009	3,494	17.5	18.7	18.5
East North Central	878	851	796	6.8	5.3	4.2
West North Central	1,004	829	942	7.8	5.1	5.0
South Atlantic	2,452	2,876	3,536	19.0	17.8	18.7
East South Central	71	90	115	0.5	0.6	0.6
West South Central	858	933	1,095	6.7	5.8	5.8
Mountain	438	524	560	3.4	3.2	3.0
Pacific[b]	3,685	5,076	6,276	28.6	31.5	33.2

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Data represent prime contract awards over $25,000, effective 1983, and over $10,000 for previous years.
b Includes Alaska and Hawaii.

glossary

Aeronautics: the science that treats of the operation of aircraft, also, the art or science of operating aircraft.

AIA: Aerospace Industries Association of America, Inc., formerly Aircraft Industries Association.

Aerospace Industry: the industry engaged in research, development and manufacture of aerospace systems, including manned and unmanned aircraft; missiles, space launch vehicles, and spacecraft; propulsion, guidance and control units for all of the foregoing; and a variety of airborne and ground based equipment essential to the test, operation, and maintenance of flight vehicles.

Aerospace Employment: annual average calculated as one-twelfth of sum of monthly estimates of total number of persons employed during a designated pay period by the aircraft and missile and space industries (SIC 372 and 376) plus estimated aerospace-related employment in the communications equipment (SIC 3662) and instruments (SIC 381 and 382) industries and in certain other industries (SIC 28, 35, 73, 89, etc.).

Aerospace Payroll: estimated on the basis of average weekly earnings for a given calendar year for production workers plus an estimated annual salary for other employees.

Aerospace Sales: the AIA estimate of aerospace industry sales, developed by summing the (1) DOD expenditures for procurement of aircraft and missiles; (2) estimates of DOD expenditures for RDT&E of aircraft and missiles; (3) NASA expenditures for research and development; (4) outlays for space activities by DOD and other U.S. Government departments and agencies; (5) net sales of aerospace products to other than U.S. Government, including civil aircraft products (domestic sales and exports), commercial sales of space-related equipment, and exports of missiles and military aircraft (both commercial and FMS); and (6) non-aerospace sales of major aerospace companies.

Air Carriers: the commercial system of air transportation, consisting of domestic and international scheduled and charter service.

Aircraft: all airborne vehicles supported either by buoyancy or by dynamic action. Used in this volume in a restricted sense to mean an airplane—any winged aircraft, including helicopters but excluding gliders and guided missiles.

Aircraft Agreement (Agreement on Trade in Civil Aircraft): negotiated in the Tokyo Round of the Multilateral Trade Negotiations, and implemented January 1, 1980, providing for elimination of tariff and non-tariff trade barriers in the civil aircraft sector.

Aircraft Industry: the industry primarily engaged in the manufacture of aircraft, aircraft engines and parts, aircraft propellers and parts, and aircraft parts and auxiliary equipment. A sector of the **Aerospace Industry.**

Airframe: the structural components of an airplane, such as fuselage, empennage, wings, landing gear, and engine mounts, but excluding such items as engines, accessories, electronics and other parts that may be replaced from time to time.

Airlines: see **Air Carriers.**

Appropriation (Federal Budget): an act of Congress authorizing an agency to incur obligations and make payments out of funds held by the Department of the Treasury.

Assets, Net: the sum of all recorded assets after reducing such amount by allowance of reserve for bad debts, depreciation and amortization, but before deducting any liabilities, mortgages or other indebtedness.

Astronautics: the art and science of designing, building and operating manned or unmanned space objects.

Average Weekly Hours: average hours for which pay was received; different from standard or scheduled hours.

Backlog: the sales value of orders accepted (supported by legal documents) that have not yet passed through the sales account.

Budget Authority: authority provided by the Congress; mainly in the form of **Appropriations,** which allows Federal agencies to incur obligations to spend or lend money.

Bureau of the Census: an agency of the Department of Commerce.

Bureau of Economic Analysis (BEA): an agency of the Department of Commerce.

Bureau of Labor Statistics (BLS): an agency of the Department of Labor.

Constant Dollars, see **Deflator.**

Deflator: index used to convert a price level to one comparable with the price level at a different time, offsetting the effect of inflation. The base period, which equals 100, is usually specified as either a given fiscal or calendar year. **Constant Dollars** are calculated by dividing current ('then-year') dollars by appropriate price deflator, and multiplying by 100.

Depreciation: the general conversion of the depreciable cost of a fixed asset into expense, spread over its remaining life. There are a number of methods, all based on a periodic charge to an expense account and a corresponding credit to a reserve account.

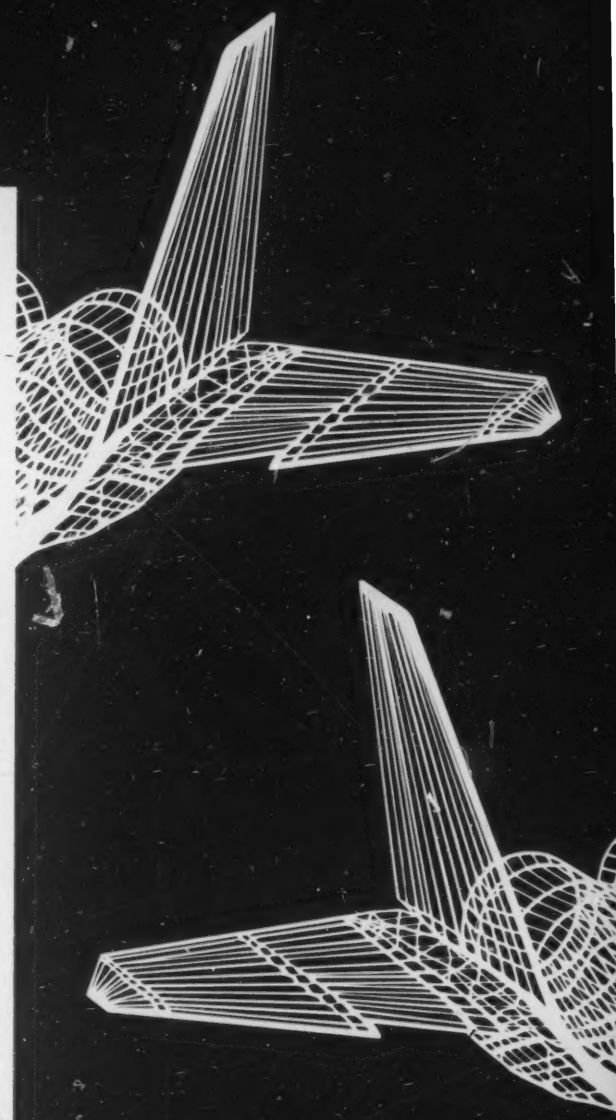
Development: the process or activity of working out a basic design, idea or piece of equipment (see **Research).**

DOD: Department of Defense.

DOE: Department of Energy.

DOT: Department of Transportation.

Durable Goods Industry: comprised of



major manufacturing industry groups with SIC Codes 24, 25, and 32-39. All major manufacturing industry groups in SIC Codes 20-23 and 26-31 are considered nondurable goods manufacturing industry groups.

Earnings: the actual return to the worker for a stated period of time. Irregular bonuses, retroactive items, payments of various welfare benefits, and payroll taxes paid by employers are excluded.

Average Hourly Earnings: on a "gross" basis, reflecting not only changes in basic hourly and incentive wage rates, but also such variable factors as premium pay for overtime and late shift work, and changes in output of workers paid for an incentive plan.

Average Weekly Earnings: derived by multiplying average weekly hours by hourly earnings.

ERDA: Energy, Research and Development Administration. ERDA was formed in 1974 to bring together activities previously scattered among several agencies. The major elements covered were nuclear energy, fossil energy, solar and geothermal energy, conservation through increased efficiency and environmental controls. Most of these functions were assumed by the Department of Energy as of October 1, 1977.

Establishment: the basis for reporting to the Census of Manufacturers; an operating facility in a single location.

Evaluation: (Department of Defense): determination of technical suitability of material, equipment or a system; see **RDT&E.**

Expenditures (Federal Budget): see **Outlays.**

Exports: domestic merchandise including commodities which are grown, produced, or manufactured in the United States, and commodities of foreign origin which have been changed in the United States from the form in which they were imported, or which have been enhanced in value by further manufacture in the United States, and which are traded or sold to other nations.

FAA: Federal Aviation Administration (formerly the Federal Aviation Agency), an agency of the Department of Transportation.

Facility: a physical plant or installation including real property, building, structures, improvements and plant equipment.

Fiscal Year (Federal Budget): until June 30, 1976, year beginning July 1 and ending June 30, and designated by the year in which it ends. Beginning October 1, 1976, the fiscal years run from October 1 through September 30 and are designated by the year in which they end. A three month **Transition Quarter** from July 1 through September 30, 1976, belongs to neither fiscal year.

Flyaway Value: includes the cost of the airframe, engines, electronics, communications, armament and other installed equipment.

Foreign Military Sales (FMS): export sales to foreign governments arranged through the Department of Defense, whereby DOD recovers full purchase price and administrative costs; often mistakenly used to include foreign military aid and foreign commercial sales as well.

FY: see **Fiscal Year.**

General Agreement on Tariff and Trade (GATT): a multilateral treaty, subscribed to by over 80 governments which together account for more than four-fifths of world trade; its aim is to liberalize world trade; the only multilateral instrument that lays down agreed rules for international trade.

General Aviation: all civil flying except that of air carriers.

GNP (Gross National Product): the market value of the total output of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for business and institutional consumption of durable goods. It includes

the purchase of goods and services by consumers and government, gross private domestic investment and net exports.

Helicopter: a rotary-wing aircraft which depends principally for its support and motion in the air upon the lift generated by one or more power-driven rotors, rotating on substantially vertical axes. A helicopter is a **V/STOL.**

Heliport: an area, either at ground level or elevated on a structure, that is used for the landing and take-off of **helicopters** and includes some or all of the various facilities useful to helicopter operations such as helicopter parking, hangar, waiting room, fueling and maintenance equipment.

Helistop: a minimum facility **heliport,** either at ground level or elevated on a structure for the landing and takeoff of **helicopters** but without such auxiliary facilities as waiting room, hangar parking, etc.

ICBM: Intercontinental Ballistic Missile, with a range of more than 5,000 miles.

Imports: classified as "general imports" or "imports for consumption." This volume refers generally to "imports for consumption," which are entries for immediate consumption plus merchandise withdrawn from bonded storage warehouses for consumption. Data are compiled from Import Entries filed with U.S. Customs officials, and are in general based on the market value or price in the foreign country at the time of exportation of such merchandise, including the cost of containers and coverings, as well as other charges and expenses incidental to placing the merchandise in condition, packed and ready for shipment to the United States, but excluding import duties, insurance, freight and other charges incidental to arrival of the goods in the United States. The foreign values of imported merchandise are converted into U.S. currency at the rate of exchange prevailing on the day the merchandise is shipped to the United States.

Income:

Net Operating Income: total net sales (see **Sales**) less total operating costs.

Net Income (Before Income Taxes): Net Operating Income plus or minus **"Other Income and Expenses."**

Other Income and Expenses: includes interest income, royalty income, capital gains and losses, interest expense, cash discounts, etc.

Net Income (After Income Taxes): Net Income (Before Taxes) less federal income taxes.

Manufacturing Industries: those **establishments** engaged in the mechanical or chemical transformation of inorganic or organic substances into new products, and usually described as plants, factories, or mills, which characteristically use power-driven machines and materials-handling equipment; also establishments engaged in assembling component parts of manufactured products if the new product is neither a structure nor other fixed improvement.

Merchandise Trade Balance: the difference between the value of U.S. goods exported to other countries and foreign goods imported into this country. The trade balance is generally regarded as "favorable" when **exports** exceed **imports**—a trade surplus—and "unfavorable" when **imports** exceed **exports**—a trade deficit.

Missile: sometimes applied to space launch vehicles, but more properly connotes automated weapons of warfare, *i.e.*, a weapon which has an integral system of guidance, as opposed to the unguided rocket.

Multilateral Trade Negotiations (MTN): a forum within the **GATT** in which countries negotiate to overcome their trade problems. In September 1973, in Tokyo, over 100 nations launched new multilateral trade negotiations, called the "Tokyo Round," covering both tariff and non-tariff barriers to trade in industrial and ag-

ricultural products, and improvements in the **GATT** itself.

NASA: National Aeronautics and Space Administration.

NATO: North Atlantic Treaty Organization.

New Obligational Authority (Federal Budget): see **Budget Authority.**

Non-Aerospace Products and Services: products and services other than aircraft, missiles, space vehicles, and related propulsion and parts, produced or performed by establishments whose principal business is the development and/or manufacture of aerospace products.

OASD: Office of the Assistant Secretary of Defense.

Obligations (Federal Budget): commitments made by Federal agencies to pay out money for products, services or other purposes—as distinct from the actual payments. Obligations incurred may not be larger than **budget authority.**

Orders, Net New: the sales value of new orders (supported by legal documents) minus cancellations during the period.

Other Aerospace Products and Services: all conversions, modifications, site activation, and other aerospace products (including drones) and services, plus research and development under contract, defined as basic and applied research in the sciences and in engineering, and design and development of prototype products and processes.

Outlays: checks issued, interest accrued on the public debt, or other payments made, net of refunds and reimbursements.

Overtime Hours: that portion of the gross average weekly hours which was in excess of regular hours and for which premium payments were made.

Payroll, All Manufacturing: includes the gross earning paid in the calendar year to all employees on the payroll of operating manufacturing **establishments.** Includes all forms of compensation paid directly to workers such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Does not include employers' Social Security contributions or other non-payroll labor costs such as employees' pension plans, group insurance premiums, and workmen's compensation.

Passenger-Mile: one passenger moved one mile.

Procurement: the process whereby the executive agencies of the Federal Government acquire goods and services from enterprises other than the Federal Government.

Production Workers: includes working foremen and all non-supervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, janitorial services, product development, auxiliary production for plant's own use and record keeping and services closely associated with the above production operations.

R&D: Research and Development.

Research: systematic study directed toward fuller scientific knowledge or understanding of the subject studied. Research is classified as either **basic** or **applied** according to the objectives of the sponsoring agency.

Basic Research: with the objective of gaining fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

Applied Research: with the objective of gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

Development: the systematic use of scientific knowledge directed toward

the production of useful materials, devices, systems, or methods including design and development of prototype and processes.

Independent Research and Development (IR&D): a term devised by the Department of Defense and used by Federal agencies to differentiate between a contractor's research and development technical effort performed under a contract, grant, or other arrangement (R&D) and that which is self-initiated and self-funded (IR&D).

Industrial Research and Development: research and development work performed within company facilities, funded by company or Federal funds, and excluding company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

RDT&E: (Department of Defense): Research, Development, Test and Evaluation.

Research: see **R&D.**

Rotorcraft: an aircraft which in all its usual flight attitudes is supported in the air wholly or in part by a rotor or rotors, *i.e.*, airfoils rotating or revolving about an axis (see **Helicopter).**

Sales: net of returns, allowances, and discounts, the dollar value of shipments, including dealer's commission, if any, which have passed through the sales account.

Satellite: a body that revolves around a larger body, such as the moon revolving around the earth, or a man-made object revolving about any body such as the sun, earth, or moon.

SIC (Standard Industrial Classification): a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. See **Aerospace Industry** for explanation of SIC codes applicable to the aerospace industry.

Space Vehicle: an artificial body operating in outer space (beyond the earth's atmosphere).

Stockholder's Equity: assets minus all obligations of the corporation, except those to stockholders. Annual data are average equity for the year (using four end-of-quarter figures.) For details, see "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations," compiled by the Bureau of the Census.

STOL: short take-off and landing aircraft.

Test (Department of Defense): an experiment designed to assess progress in attainment or accomplishment of development objectives (see **RDT&E).**

Thrust: the driving force exerted by an engine, particularly an aircraft or missile engine, in propelling the vehicle to which it is attached.

Ton-Mile: one ton moved one mile.

Total Obligational Authority: the sum of **budget authority** granted or requested from the Congress in a given year, plus unused **budget authority** from prior years.

Trade Balance: see **Merchandise Trade Balance.**

Transition Quarter (Tr. Qtr.): the three-month interval from July 1, 1976 to September 30, 1976. See **Fiscal Year.**

Turbine, Turbo: a mechanical device or engine that spins in reaction to a fluid flow that passes through or over it. Frequently used in "turboprop" or "turbojet."

U.K.: United Kingdom.

U.S.: United States of America.

USA: United States Army, an agency of the U.S. Department of Defense.

USAF: United States Air Force, an agency of the U.S. Department of Defense.

USN: United States Navy, an agency of the U.S. Department of Defense.

USSR: Union of Soviet Socialist Republics.

Utility Aircraft: an aircraft designed for general purpose flying.

V/STOL: vertical short take-off and/or landing aircraft.

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Allied Corporation, Bendix Aerospace
Aluminum Company of America
Avco Corporation
The Boeing Company
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  Chandler Evans Inc.
  Delevan Corporation
  Menasco Inc.
Criton Technologies
E-Systems, Inc.
Ex-Cell-O Corporation
FMC Corporation
The Garrett Corporation
Gates Learjet Corporation
General Dynamics Corporation
General Electric Company
General Motors Corporation
  Allison Gas Turbine Division
The BFGoodrich Company
Goodyear Aerospace Corporation
Grumman Corporation
Hercules Incorporated
Honeywell Inc.
Hughes Aircraft Company
IBM Corporation
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  ITT Aerospace/Optical Division
  ITT Avionics Division
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